THE IRON TRADE REVIEW

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Iron Ore Prices Advanced 75 Cents

Buying Movement Starts and Immense Tonnage Will Be Sold This Week—Pig Iron Market Very Strong

THE sale of Lake Superior iron ores for 1916 delivery has been started at an advance of 75 cents per ton over the 1915 prices, the new prices being: Old range bessemer, $4.50; Mesabi bessemer, $4.20; old range non-bessemer, $3.75; Mesabi non-bessemer, $3.55. Although it had been known that the buying might be started any time, the actual inauguration came unexpectedly late Tuesday, and by Wednesday morning nearly all the important ore companies had salesmen in the field. Reservations are being rapidly changed into actual orders and it seems probable that before the end of the week practically all of the ore to be delivered next year, generally estimated at about 55,000,000 tons, will be disposed of. Owing to the great strength of the pig iron market, it seemed likely that the advance on ore would be $1, and some of the sellers are disappointed that a $1 advance was not established. Sales have been made in the east of New York and New Jersey ores at prices equivalent to an advance of 75 cents above last year. Iron ore shipments for the season in the Lake Superior district amount to 46,318,804 tons, an increase of 14,296,907 tons over 1914, and only 2,751,674 tons less than the record year, 1913.

Pig Iron

The pig iron market steadily gains strength, and in the valleys the demand for steel-making grades continues with the probability that the $20 quotation will soon prevail. On No. 2 foundry, $18 is now the quotation in the valley, in Cleveland and Toledo, and at Buffalo even more is being asked. The demand for basic and bessemer for shipment to England and Italy is strong. In the south very little iron is to be had at less than $14 and most furnaces are quoting $14.50 for first half delivery.

Pig Iron Production

November, with 30 days, made a slight gain in average daily production of coke and anthracite pig iron, the figures being 101,174 tons, compared with 100,656 tons in October, a gain of 518 tons. The total production for November was 3,035,235 tons, compared with 3,120,340 tons in October's 31 days. The slight gain made by November shows clearly the furnaces have been driven almost to their limit and it is doubtful whether production can be increased very much for several months, as a number of stacks will soon be put out for relining.

Machinery

Great Britain has succeeded in increasing its output of ammunition to such an extent that it is not placing orders to the extent that it did in this country, but the government of Russia is more active than ever in buying equipment. It is placing orders for lathes and a general line of machine tools for the earliest possible delivery, which, in the case of some manufacturers, is four or five months ahead. Demand from American concerns making ammunition is active, but orders are not large.

Finished Materials

The action of the Pennsylvania railroad in placing orders for part of its car requirements, after withdrawing from the market on account of the higher price asked, furnishes strong evidence of the strength of the position of finished materials. A number of other railroads have placed car orders and many more inquiries are pending. Plates are very strong, as are also shapes, and the demand for bars continues very active. Many mills, being already overwhelmed with business, are avoiding the taking on of additional orders and buyers are finding it difficult to cover for their requirements.

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The President's Message

EVERY true American heart will beat in sympathy with the President's words of burning denunciation of those hyphenated citizens who "turn in malign reaction against the government and people who welcomed and nurtured them and seek to make this country once more a hot-bed of European passion". Certainly everything that can be done in the way of passing laws or otherwise should be done to crush out "such creatures of passion, disloyalty and anarchy".

With the President's plan of preparedness there will be agreement as a general proposition, but doubtless there will be much discussion of details. Probably the most doubtful point is as to the continental army, which would be an experiment, while the enlargement of the national guard as proposed by Governor Willis, of Ohio, and others, will have strong support.

Unfortunately the President adheres to the idea that the only way to start the upbuilding of a merchant marine is for the government to own and operate ships. He grants that this policy would be temporary and says that ultimately the merchant marine must be owned by private capital, but we do not believe that the American people will tolerate his policy even as a temporary expedient. The "admirable enterprise, intelligence and vigor" which the President commends in private undertakings, will, if given a fair chance and proper assistance, restore the American merchant marine on a sound basis.

The suggestion of the levying of a tax of 25 cents a ton on pig iron and 20 cents a ton on "fabricated iron and steel" comes as a distinct surprise. Why the iron industry should be singled out to bear this heavy burden is not clear, but it has never shirked its patriotic duty and if this form of taxation is necessary to carry out the plan of reasonable preparedness, the tax will be paid without complaint. It will, however, be necessary to demonstrate why the gasoline and iron industries should be assessed so heavily.

The paragraph of the message relating to new taxes strikes one as being very crude. For example, a "tax of 50 cents per horsepower on automobiles and internal explosion engines" is proposed. This means a very heavy tax on internal explosion engines of automobiles, but is written as if the President did not so understand it. The expression "fabricated steel" probably was intended to include all rolled products, for what is known as fabricated material in the trade would not produce anything like $10,000,000 in taxes at 20 cents per ton. It is clear that the President needs the assistance of advisers who know something about manufacturing processes. He said it ought to be easy to distribute the burdens of taxation in a country of great industries, so that the taxes would not bear too heavily upon any one set of persons or undertakings. If it is thought that the makers of iron and steel are profiting on account of the war and therefore should be taxed more heavily, why not put a tax on everything that shows an increase in exports since the war was started?

The Right Spirit

IT IS positively refreshing to read such an address as that delivered recently in New York by Edward Hurley, vice chairman of the federal trade commission, on "Some Business Problems of Today". Unlike many agitators who have been in government service or have wanted to get into it, and have thought that the best way to succeed was to attack business, Mr. Hurley takes the broad ground that government and business are and should be mutually helpful and then he proceeds to point out how they can help each other. He gives some interesting statistics showing that while big business is important, it constitutes but a small percentage of the trade and industry of the United States. There are about 250,000 business corporations in the country and over 100,000 have no net income at all, while 90,000 make less than $5,000 a year, leaving only 60,000, the more successful ones, making $5,000 a year and over. This shows that there are a large number of unsuccessful business concerns and that they need help.

Mr. Hurley points out very clearly and in some detail that the real constructive help must come from within. He says that the greatest need is for better business methods and emphasizes the importance of thorough cost accounting systems which are absolutely necessary in order to insure successful management. The federal trade commission cannot compel the adoption of such systems, but it does wish to act in an advisory capacity and do all it can properly to improve business methods. Mr. Hurley shows how such activities of the commission would result in helping individual enterprises, in benefiting employes, investors and the public. He heartily endorses trade associations and says there should be a greater degree of organization and mutual helpfulness. He does not agree with those who say that the European countries will not be able seriously to compete with the United States soon after the war. He says that not a smoke stack has been destroyed during the war in England, Germany or Italy and only a few in a small part of France. He believes in preparing to meet keen competition from abroad and says that he was recently astonished to learn that the belief exists among many business men that non-competing concerns cannot

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co-operate and form selling agencies to develop foreign business.

Throughout his address, Mr. Hurley spoke in a spirit of progressive helpfulness. His words will do much to insure the hearty co-operation of business men in the work of the new commission.

Uncle Sam's Figures

IN AN extended article on the failure of private ship yards to present as low prices as the government yards for the construction of battleships 43 and 44, on which bids were recently taken, the *Boston Herald* explains why the private concerns cannot underbid the government yards. Some of the reasons may be condensed as follows:

Depreciation of plant in private yards for the three years in which a battleship would be building is a factor of consequence to the private concern, which estimates the depreciation at 5 per cent per annum of the total building and machinery value for the period the ship is under construction. The government enters nothing for this item. Congress is depended upon to make appropriations to cover depreciation.

The private company must pay for its drawings and plans, which amount to about $250,000 for a battleship. In the navy yards this charge is provided for by a special appropriation.

The cost of clerks, timekeepers and other minor officials comes out of the general expense of the navy and is not charged to the cost of building any particular ship. This makes an item of about $125,000 which the company must include in its cost.

Salaries of officers detailed for duty in connection with the construction of a battleship are charged by Uncle Sam to the navy payroll and not to the ship. This makes a considerable item, usually in excess of $30,000.

Insurance and indemnity bonds amount to about $100,000 with a private company, but Uncle Sam does not worry about such little things as these.

The government allows all employes in the navy yards sick leave, holidays, vacations, etc. These are charged to a special appropriation, amounting to about $350,000, in the construction of a ship. This item must be included in overhead charge to the company.

The private ship builder includes in his estimate $100,000 for trials, but the government holds its trial and makes a charge against operation and not against construction.

Owing to such expediencies as the above, the New York navy yard makes up its estimate by entering $745,357 for overhead charges, while private yards have found by experience that they must rate this factor at approximately $2,000,000.

Of course, the navy yards ordinarily can submit lower bids than the private companies, but what is gained by this kind of fallacy? The bids do not represent the real cost and if anybody is fooled, it is because he is not informed. It is doubtful whether, owing to the high price of steel indicated by the bids opened last week, the yards could build the two ships at a cost within the congressional appropriation. If the government could build more quickly than private yards, there might be some excuse for giving it the work, but that it does not has been shown in numerous cases. We agree with the *Herald* that if this country really wants preparedness, it must abandon all this government ownership folly and trust to the efficiency of private enterprises under the influence of real competition.

One of the War's Great Losses

THE motto of the great Cockerill works at Seraing, Belgium, is "Courage to the Last". These words were particularly appropriate in describing the life and character of Adolphe Greiner, who, after being connected with the works for more than 50 years, during half of that time managing director, passed away at his home in Liege, the stricken city of Belgium, on Nov. 20.

Mr. Greiner was in the center of the awful carnage which resulted from the fighting at the beginning of the war and unfortunately little is known as to the details of his activities, but at the meeting of the Iron and Steel Institute, of which he was president, held in London last May, it was announced that during the siege of Liege and from that time onward Mr. Greiner remained at his post, continually encouraging with his unfailing spirit the members of the staff of his company and his workmen and organizing means for the alleviation of the distress of the large industrial population dependent on the company for employment. It was then stated that notwithstanding the many anxieties through which he had passed, he and his family were in good health, but later the news came of his serious illness, due in all probability to the strain resulting from war conditions.

Men may discuss the question as to the extent to which the waste of war is apparent rather than real, but the loss of such a man as Adolphe Greiner is indeed a real one and so great that it cannot be estimated. In the death of such a man the steel industry and the world have lost a leader who under normal conditions should have been able to continue in active work for a number of years. He was 71, but until within a few months apparently had many years of practical usefulness ahead of him.

Prices Present and Past

Quotation on leading products December 8, average for November, 1915, average for September, 1915, and average for December, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Dec. 8, 1915.	Aver. for Nov., 1915.	Average for Sept., 1915.	Aver. for Dec., 1914.
Bessemer pig iron, Pittsburgh..	$19.45	$17.45	$16.80	$14.70
Basic pig iron, Pittsburgh.....	18.95	16.70	15.65	13.45
No. 2 Fdy. pig iron, Pittsburgh	18.95	16.45	15.45	13.70
Northern No. 2 Fdy., Chgo....	18.00	17.12	13.80	13.00
Lake Superior Charcoal, Chgo..	19.25	17.50	15.95	15.75
Mall., Bess., Chgo.....	18.00	17.42	14.20	13.00
Southern No. 2, Birmingham...	14.00	13.50	11.50	9.50
Southern Ohio No. 2, Ironton..	17.00	16.25	14.50	12.63
Basic, eastern Pa.....	17.75	17.75	15.25	13.50
No. 2X Virginia furnace.....	16.50	15.50	12.75	12.50
No. 2X foundry, Philadelphia...	19.00	17.75	15.00	14.25
Ferro mang., Balti., (prompt)..	100.00	100.00	110.00	68.00
Bessemer billets, Pbgh.....	29.00	27.75	24.60	19.00
Bess. sheet bars, Pbgh.....	30.00	28.25	24.60	19.50
Op.-h'th sh. bars, Pbgh.....	30.00	28.50	25.80	19.50
Open-hearth billets, Pbgh.....	29.00	28.00	25.60	19.00
Steel bars, Chgo.....	1.99	1.79	1.54	1.20
Steel bars, Pittsburgh.....	1.80	1.625	1.34	1.10
Iron bars, Philadelphia.....	1.959	1.759	1.459	1.15
Iron bars, Cleveland, local del'y.	1.75	1.50	1.35	1.15

	Prices Dec. 8, 1915.	Aver. for Nov., 1915.	Average for Sept., 1915.	Aver. for Dec., 1914.
Iron bars, Chgo. mill.....	$1.65	$1.48	$1.31	$0.95
Beams, Chgo.	1.99	1.79	1.54	1.20
Beams, Pittsburgh	1.80	1.625	1.34	1.10
Beams, Philadelphia	2.009	1.759	1.509	1.20
Tank plates, Pittsburgh.....	1.80	1.625	1.32	1.07
Tank plates, Chicago.....	1.99	1.79	1.49	1.20
Tank plates, Philadelphia.....	2.009	1.759	1.509	1.20
Sheets, blk., No. 28, Pbgh.....	2.50	2.22	1.92	1.85
Sheets, blue an., No. 10, Pbgh.	2.25	1.85	1.52	1.35
Sh., galv., No. 28, Pbgh.....	4.75	3.906	3.67	2.85
Wire nails, Pittsburgh.....	2.00	1.87	1.69	1.55
Connellsville fur. coke, contr...	2.35	2.35	1.84	1.69
Connellsville fdy. coke, contr...	3.00	2.96	2.37	2.25
Heavy melting steel, Pbgh.....	18.50	15.31	14.25	10.30
Heavy melting steel, east'n Pa.	15.50	14.50	14.50	9.50
Heavy melting steel, Chgo.....	15.50	13.13	12.00	8.25
No. 1 wrought eastern Pa.....	19.00	17.00	16.00	11.50
No. 1 wrought, Chgo.....	15.00	12.75	10.75	7.50
Rerolling rails, Chgo.....	16.50	14.31	13.15	9.50
Car wheels, Chgo.....	14.75	12.73	11.75	10.00

(For Additional Prices See Page 1154.)

Upward Movement in Pig Iron

Prices Rapidly Advancing at Leading Centers, Where Supply is Becoming Limited—Buying in Good Volume

New York, Dec. 7.—Prices of early iron appear to be rapidly gaining strength under a condition of increasing melt, reduced stocks in buyers' yards and heavy order books of the furnaces causing the latter to accept new tonnage for quick shipment or first quarter with greater reluctance. New England and eastern New York state consumers who a few weeks ago reported themselves chiefly covered on their requirements, now are putting out various inquiries for spot foundry iron, some of them for 1,000 to 2,000 tons. Fear of a possible shortage of iron later on, undoubtedly, is an influence. The market has been moving so fast that prices are a little obscure, but very little iron apparently could be had under $19, tidewater, for No. 2X. One eastern Pennsylvania seller who last was quoting around $18.50, tidewater, has withdrawn for first half. Resale iron is more of a factor, this coming from both Virginia and the Buffalo districts. In the latter case, it has been selling at $17.50, for No. 2X, or considerably below producers' prices. A Buffalo producer who is holding for $20 for No. 2X and malleable, is quoting more generally, believing that the market is approaching that figure. Pipe makers who are figuring on 43,000 tons of tunnel segments for New York subways, have inquired for about 40,000 tons of foundry iron to cover these needs. Deliveries are asked for last half and as far ahead as the makers will quote. A Troy consumer bought 5,000 tons of forge, first quarter, from a New York state furnace at a considerable advance. The General Electric Co. took 1,000 tons of high silicon, first quarter. A Bridgeport, Conn., buyer has closed partially against an inquiry for 2,600 tons of foundry for second quarter. A Paterson, N. J., buyer took about 1,000 tons of foundry and a Newark consumer recently closed for about 2,000 tons. The Eastern Malleable Iron Co. has bought a tonnage of malleable and still is in the market. A number of other inquiries of 500 and 1,000 tons, are current. The 14,000-ton requirement of the International Steam Pump Co. still is open. In export, sales of 1,000 and 300 tons of bessemer were made at $19, valley, or $21, tidewater. France is inquiring for 12,000 tons of low phosphorus. Reductions in freight rates on Virginia iron which are effective Dec. 1 and Jan. 1, place New Jersey points in this district on a flat rate of $3 per ton, and others and lower Hudson river points at $3.25.

Some $20 Iron

Philadelphia, Dec. 6.—A price of $20 for iron no longer is mere talk in eastern Pennsylvania and contiguous territory. Several sales have been made at this figure by several producers, one of 500 tons of Lehigh valley No. 2X foundry for last half. Another Lehigh valley maker now is quoting $20, furnace, as a minimum for No. 2X for first half and has sold small lots. A sale of 300 tons of first quarter No. 2X was made by a central Pennsylvania maker. The situation is characterized by a growing tension in iron for early delivery. The demand for early shipment metal has been increasing in a marked way and the very consumers who reported six or eight weeks ago that they would need no more iron this year, now are inquiring for good tonnages for immediate shipment. Practically all the eastern Pennsylvania makers now ask minimums of $18, furnace, or more, for No. 2X for shipment by July 1, or about $18.50 to $19, Philadelphia. One maker, however, still has been accepting business at $17.50, furnace, or $18.34, Philadelphia, for No. 2X. Pipemakers have been buying more heavily. A Phillipsburg, N. J., shop recently has taken 10,000 to 15,000 tons, including a round ton-

(*For complete prices see page* 1154.)

nage of Ohio iron. The Standard Cast Iron Pipe & Foundry Co., Bristol, Pa., has been closing for 5,000 tons of two grades second quarter. Another buyer took 2,000 tons of forge at $17.50, delivered. A Trenton shop asks 1,000 tons of Nos. 1X and 2 plain, first half. Special Virginia No. 2X has brought $17, furnace, for No. 2X. The Virginia Iron, Coal & Coke Co. now is offering a limited tonnage of high manganese No. 2X at $16.75, furnace, for first quarter, and at $17 for second quarter. Southern makers took the 6,000 tons of foundry asked by the Lenoir City, Tenn., car works. Sales of steel-making iron are moderate, as the larger consumers are covered. A Perth Amboy, N. J., buyer closed for 2,000 tons of first half basic at $18, delivered. A Cumberland, Md., steelmaker bought 4,000 to 5,000 tons of western basic for first half at over $19, delivered, and also 1,000 tons of prompt to come from the same district. Standard makers of low phosphorus still offer but moderate lots before July because of heavy orders. On one inquiry $32, Philadelphia, was quoted this week. One Lebanon maker now is quoting $32 to $34, furnace, or more than for standard iron and reports small sales at even higher figures. A Wilmington buyer recently took 1,000 to 2,000 tons of malleable.

Pig Iron Prices Tend Upward

Pittsburgh, Dec. 7.—Prices of steel-making pig iron grades rapidly are approaching $20, valley, at which figure most dealers are holding basic and bessemer iron for shipment after Jan. 1. Demand for both grades for shipment to England and Italy is decidedly heavy and prospective buyers appear willing to pay almost any price for foreign delivery. Last week, one lot of 2,000 tons of basic and another of similar tonnage sold at prices equivalent to $17.80 and $18.40, valley furnace, for export to England. Some bessemer iron for domestic delivery has commanded $19, valley. Foundry and malleable grades are being held at $18, valley, and above. Blast furnaces are being pushed to the limit of their productive capacities to meet the insistent demand of consumers. It is not unlikely that a number of stacks which have been idle many years will be blown in this month.

According to figures compiled by W. P. Snyder & Co., the average price of bessemer and basic pig iron in November was $16.615 and $15.518, valley, respectively. Compared with averages for the preceding month, bessemer advanced $0.615 and basic advanced $0.4933 a ton. Compared with figures for the corresponding month of 1914, bessemer and basic iron in November advanced $2.9775 and $3.041, respectively. Both grades have registered price advances every month since last May.

More $20 Iron at Buffalo

Buffalo, Dec. 7.—With sales totaling from 12,000 to 15,000 tons several of the furnace interests of the Buffalo territory have now raised their quotations to $20 on any grade of iron as their absolute minimum. This price, however, is in the nature of a stop sale schedule owing to the sold up conditions of their stacks. Iron is obtainable in this market from another interest at the schedule quoted a week ago, namely at a minimum of $17.50 for the ordinary grades and upwards according to the silicon content. High silicon iron is scarce in this market and there is practically a famine of iron running up to 8 to 15 per cent. Bessemer iron is also out of this market for the present. There is little malleable and more sales for immediate delivery have been made at $20, f. o. b. furnace. There is a continued demand for special grades and these too are bringing $20.

Producing interests are turning down overtures on the part of consumers to enter their orders for last half of 1916 deliveries. Several thousand tons offered for such extended deliveries have been declined by the furnaces here.

Getting Stronger

Cleveland, Dec. 7.—The pig iron situation along the lake, including Toledo, Detroit, Buffalo and Erie as well as Cleveland, is steadily and rapidly getting stronger. There is a scarcity of pig iron at Detroit and at Toledo, where the prices have been advanced 50 cents, making the quotation $18, furnace, customers are being limited in the tonnages sold to them. In Cleveland, the price of No. 2 foundry and basic has been advanced to $18, furnace, an advance of $1 since last week, and sales are being made at the new quotation. The melt is heavy and foundries are taking on additional tonnages on account of the increased demand for castings.

Firm at Chicago

Chicago, Dec. 7.—Makers of pig iron in the Chicago district are entertaining some inquiry for third quarter and last half on the part of melters who desire to protect their requirements during that period. While no open quotation has been made, tonnages may be contracted for delivery through 1916 at $18, Chicago furnace. No tendency is apparent to charge a premium for last half over earlier delivery.

Buying seems to be somewhat less at present, as is natural in the closing month of the year, especially in view of the fact that unusual buying has preceded. Some melters are taking prompt tonnage to fill out their needs for the remainder of this year. Southern iron apparently is firm at $14, Birmingham, with an elusive rumor persistent that tonnage has been offered at $13.50, Birmingham. However, it has not been possible to run down actual instances where this figure was made.

Lake Superior charcoal iron has advanced $4 per ton during the past week and one large producer is now asking $20.75 to $23.75, delivered, Chicago. Two other makers are still taking tonnage on a basis of $19.25 to $22.25, delivered, Chicago. One of these announces it is willing to take on 15,000 to 20,000 tons at this price, while the interest holding the high price is practically sold out for first half.

An inquiry for malleable iron from a car builder in Indiana, involving 1,500 tons, seems likely to be taken by a charcoal furnace in the present price situation.

Prices Higher

Cincinnati, Dec. 7. — Southern Ohio No. 2 foundry iron continues to advance, and is now quoted at from $17 to $17.50, Ironton basis, for first half delivery. No malleable or basic iron is obtainable from furnaces, as they are sold up on these grades until well into the second quarter. A small amount of southern resale iron was sold during the latter part of last week at $13.25, Birmingham basis, for No. 2 foundry, for spot shipment, but this has entirely disappeared, and only an extremely small lot of this grade can now be had at $13.50 for delivery before the middle of December. One furnace is offering iron at $14, Birmingham basis, for the first quarter, but all others in the south are holding at $14.50 for the first half, with no quotations for prompt delivery. Silvery iron is unchanged at $25, furnace, for eight per cent silicon, and bessemer ferro-silicon is quoted at $27, furnace, for from 10 to 11 per cent. Sales and inquiries are light. A local melter is out for 2,000 tons of foundry iron, a Dayton, O., user wants 1,500 tons of foundry grades, and an Indiana consumer is inquiring for 2,000 tons of foundry iron, all for first half delivery.

Moderate Activity

St. Louis, Dec. 7.—An inquiry for 3,000 tons of northern basic iron and one for 1,000 tons of malleable are perhaps the most interesting features of the local iron market. The most important sales in this territory last

(*For complete prices see page* 1154.)

week was 500 tons of northern iron. Business is somewhat slack, but dealers are encouraged. Southern No. 2 is held here at $14.50, Birmingham, for first half delivery. Northern iron is offered at $18, Chicago, and $17, Ironton.

Inquiry is Active

Birmingham, Ala., Dec. 7.—Some pig iron still is being sold here at $13.50 for No. 2 foundry for first half delivery, but the prevailing quotation now is $14 with all except one maker.

Inquiry is active and seems to be coming in the great majority from the smaller buyers and foundrymen who apparently have kept out of the rising market as long as possible, believing that prices would not continue to advance.

The larger buying interests are understood to have covered for practically the first quarter and are now working quietly to feel out the market for second half delivery. Furnaces are very active, every stack in the district which is in repair being in blast.

Movement of iron is good, but makers complain that shortage of cars still is hampering shipments to a slight degree.

Bar Delivery is Delayed

Mills Unwilling to Promise Some Sizes for Many Months —Specifications Are Very Heavy

Philadelphia, Dec. 6.—On an inquiry for a certain size of flats, one large steel bar maker this week was unwilling to promise delivery before October. This incident illustrates the extreme way in which some of the mills have been choked by scarcity of steel. Several of the larger steel bar makers remain completely out of the market as far as new business is concerned and are holding their consumers to the strict figure of their contracts. Any over-specifications are regarded as new business and are entered at the prevailing market. Specifications are very heavy here. Prices of steel bars are uncertain since 1.70c, Pittsburgh, remains nominal with most makers and a figure for actual business probably would be 1.80c to 1.85c, Pittsburgh. The demand for large rounds is less urgent. Eastern Pennsylvania makers still are out of the market, generally, and their views of prices on any odd lots they might be able to offer are 3.75c, mill.

Buying for Later Delivery

New York, Dec. 7.—Foreign buyers of large rounds for shell manufacture who up to this time have been insisting on deliveries by July 1, now are willing to place tonnage for shipment beyond that date. On new inquiries of 60,000 to 70,000 tons, placed before one seller in this city the past week, 1916 delivery was stipulated. French steel works which have been buying heavily still are in the market for large additional tonnages and will accept shipment beyond July 1. It is believed these buyers will require several hundred thousand tons additional. One new inquiry of the week called for about 40,000 tons. Makers of rounds are willing to accept lower prices for last half shipment than for first half and it is probable that a tonnage could be placed considerably below 3c, mill.

Scarce at Chicago

Chicago, Dec. 7.—Steel bars continue to be the scarcest thing in the market and the nominal quotation has been advanced to 1.99c, Chicago mill, while actual sales for any reasonable delivery command a premium of varying size. Sales have been made at 2.44c, Chicago, and even higher when necessity of the consumer has been sufficient to meet demands of those who have bars for early delivery.

Hard steel bars are now quoted at 1.80c, Chicago mill, with excellent demand. Advancing prices of re-rolling rails are responsible for much of this increase.

Bars Higher

Pittsburgh, Dec. 7.—Manufacturers of iron bars in western Pennsylvania have advanced quotations $3 and $4 a ton to 1.85c and 1.90c for future delivery. Steel bars nominally are quoted at 1.70c for future shipment. Mills are unable to promise bar steel however in less than from four to six months. Demand for material is more insistent than ever. Specifications for large rounds for the manufacture of shrapnel shells have not fallen off.

Far Behind in Deliveries

Buffalo, Dec. 7.—Orders continue to come in freely but mills are accepting new tonnage only in the case of urgent needs of established customers. The producers have become so far behind in deliveries that the policy of apportioning same so as to cover the reasonable pro rata requirements of the users has been established by a number of interests. Orders booked subject to mills' convenience has come to mean deliveries during the closing part of second quarter of 1916. The nominal price for steel bars remains at 1.70c as previously quoted while the price of iron bars has advanced to 1.75c and 1.80c at the mills, due it is claimed, to the growing scarcity of scrap. Most of the producing interests are declining to quote owing to their positive inability to make shipments within a reasonable time and their disinclination to commit themselves far into the future.

Advanced $2

New York, Dec. 7.—Another advance of $2 a ton has been put into effect by eastern bar iron makers, placing the market at 1.80c, Pittsburgh, or 1.969c, New York. Makers continue to receive liberal orders and most of them are unable to make shipments under several weeks. The congestion in the steel bar market is adding greatly to the bar iron demand.

Bar Iron Firmer

Chicago, Dec. 7.—Makers of iron bars are still quoting 1.60c, Chicago, nominally, but 1.65c to 1.70c, Chicago, represents the market more truly. While one maker is willing to take a small tonnage at 1.60c, this must be of unusually attractive specification and 1.65c is the general asking price at which most tonnage is being booked. Some small sales have been made at 1.70c, Chicago.

Hoops, Bands and Shafting

Pittsburgh, Dec. 7.—Demand for hoops and bands is increasing in volume rapidly. Shipments now are deferred three or four months and most mills are refusing to book additional orders. Hoops and bands are commanding 1.90c and 1.70c, respectively.

Cold rolled steel shafting is being held at 50 per cent off the list and above. Most manufacturers are refusing to sell additional tonnages.

Cold rolled strip steel products are not being offered in the open market. Manufacturers in western Pennsylvania have withdrawn formal quotations, being unable to assume additional obligations for the first half of 1916.

The Sharpsville furnace, Sharpsville, Pa., recently acquired by the Allen S. Davison Co., Pittsburgh, was blown in Dec. 1 on bessemer pig iron. The plant has been idle several years.

(*For complete prices see page* 1154.)

Early Plates Still Higher

Sales at Advanced Prices for Prompt Delivery— Five More Boats Ordered in the East

Philadelphia, Dec. 6.—From 2.20c to 2.25c, Pittsburgh, now is being obtained by eastern Pennsylvania makers, on early plates; that is for shipment in three to four weeks. Some fair-sized lots are being taken at this price. On current business, 2.00c, Pittsburgh, still is quoted by some makers, but this is the minimum among eastern producers. Where the sizes are such that they can be fitted into mill schedules, shipment runs from 10 to 12 weeks. If the order must await until the mill regularly can get around to it, it means delivery in about five months with some makers. One eastern Pennsylvania mill continues to quote first quarter contracts at 2.25c, Pittsburgh, and is booking some tonnage on this basis. Large mills outside the eastern Pennsylvania district have been quoting 1.80c, Pittsburgh, on second quarter contracts. The demand for plates upon eastern mills remains tremendous and higher prices seem to have little effect upon it. Boat orders are piling up steadily. The Newport News Dry Dock & Ship Building Co. received orders for four and the Harlan & Hollingsworth Corporation for one more vessel in the week, requiring probably 12,000 to 15,000 tons of steel.

More Vessels Ordered

New York, Dec. 7. — The Southern Pacific Steamship Co. has closed for two 6,000-ton cargo vessels and for a 7,500-ton tank ship with the Newport News Ship Building & Dry Dock Co. The same yard also has taken a tank ship for the Atlantic Refining Co. The steel requirements, about 10,000 to 12,000 tons, will be supplied by Pittsburgh and eastern mills. The Maryland Steel Co. has been awarded a third boat for the Munson line. The Continental Trading Co., which recently acquired a ship yard at Mystic, Conn., has taken orders for three Norwegian vessels, requiring about 5,000 tons of steel. The Standard Ship Building Co., which recently purchased the Shooters island ship yard on the inner New York harbor, remains in the market for 10,000 tons of plates and for 7,500 tons of shapes for four vessels upon which it is figuring.

Plates Reflect Strength

Pittsburgh, Dec. 7.—Buying of several thousand steel cars by the Pennsylvania railroad, after having withdrawn from the market on account of high prices, clearly reflects the strength displayed by finished products. With mill capacities engaged for the next six or seven months, sales managers are refusing to assume additional obligations at prevailing prices. Considerable tonnage for nearby shipment is commanding from $5 to $8 a ton above the minimum price for delivery at the convenience of the mill. Finishing mills in the Greater Pittsburgh district literally are swamped with specifications for steel plates, shapes and bars.

Boiler Plate High

Cleveland, Dec. 7.—Cleveland mills are still quoting 2.25c, Pittsburgh, as the minimum on tank plate for prompt delivery. Boiler plate is selling at 2.50c to 3c. Boilermakers are very busy and contracts could readily be made at 2.50c for first quarter, but Cleveland mills will not sell except for early shipment.

Plates Top Market

Chicago, Dec. 7.—A swift reversal in conditions surrounding the plate market has taken place in the past few weeks. Throughout the summer and fall, plates lagged behind bars and shapes, but at present they are scarcer than either of these materials. Greatly increased demand for plates by ship builders and a change in construction of freight cars to an all-steel type has called for additional plates and higher premiums are being paid than for bars and shapes.

The nominal quotation is 1.99c, Chicago mill, but most producers have practically nothing to offer except for deferred delivery. A sale was made recently by a Cleveland interest at 3.00c, Cleveland, which is believed to be the highest point yet reached.

Nuts, Bolts and Rivets

Pittsburgh, Dec. 7.—Demand for nuts, bolts and rivets continues heavy. Domestic demand is decidedly active and considerable export business is enjoyed. Prices show no change in position this week.

One More Meeting.—The National Pipe and Supplies Association will meet in the William Penn hotel May 8 and 9, the Monday and Tuesday before the triple convention to be held by the American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association. The William Penn hotel will not be opened until Feb. 1, but the management is already booking convention guests.

(*For complete prices see page* 1154.)

Coke Market

Shows Little Activity, Especially in Contract Making

Pittsburgh, Dec. 7.—Several lots of Connellsville blast furnace fuel for prompt shipment have sold at $2.35, ovens, since Saturday and dealers express the opinion that the market will be established at $2.50, ovens, within a week. Demand, however, is not heavy. The contract market is decidedly quiet. It is reported that rather heavy tonnages of by-product oven coke will be released in the east the latter part of the first quarter. Foundry coke is selling at a spread from $3 to $3.25, ovens. The *Connellsville Courier* says production the week ending Nov. 27 was 432,341 tons, a decrease of 1,061 tons compared with the previous week.

Foundry Coke Shortage

New York, Dec. 7. — Shortages of foundry coke among consumers, due to heavier melt and in some cases to delayed shipments, due to freight congestion, are causing some high prices to be paid for spot fuel. New England foundries have paid around $7.50, delivered, for a number of spot carloads, or about $4 at central Pennsylvania ovens. There has been considerable selling of spot foundry coke at $3.25 to $3.50, Connellsville ovens. The elasticity in requirement contracts has been largely eliminated and consumers are being held strictly to maximum requirements.

Furnace Coke High

Cincinnati, Dec. 7.—Scarcity of furnace coke has made it very strong, and some producers are now asking as much for it as for foundry grades, especially for prompt shipment. In some cases, ovens are unable to supply deliveries as fast as desired by consumers.

Furnace coke from the Wise county and Pocahontas districts is quoted at from $2.75 to $3, ovens, and foundry coke at from $3 to $3.25, ovens. New River grades are given at 25 cents a ton higher.

Slow Delivery

St. Louis, Dec. 6.—Coke is dull, and there is some complaint about deliveries. Connellsville and Virginia 72-hour foundry coke is held at $3.25 to $3.50, ovens.

Sheet Demand

Is Increasing—Blue Annealed is Very Scarce

Youngstown, O., Dec. 7.—Demand for black and blue annealed sheets is on the increase, rather than on the ebb as in past years in the pre-holiday season. The blue annealed market is especially excited. Valley makers practically are sold up for months ahead and some consumers who failed to cover for the first quarter have been experiencing a busy time shopping around for material. The minimum quotation for blue annealed sheets is 2.25c, Pittsburgh, for No. 10 gage, while sales are reported for nearby delivery at as high as 2.50c, and one seller has established that figure as his minimum. Black sheet prices also are stronger. The lowest prices heard today for bessemer black sheets, No. 28 gage, was 2.50c, Pittsburgh, while some makers are asking 2.60c, and a sale for prompt delivery at 2.90c, Pittsburgh, is reported. Sales for first quarter delivery have been made at 3c on the basis of No. 28 gage. Open hearth steel sheets command a premium of $2 a ton.

The galvanized sheet market is extremely irregular. Most makers have discontinued quoting on this description, for the fluctuations in the spelter market have kept sheet prices on the jump. The recent decline in spelter has been offset to some extent by higher steel costs, together with advancing prices for labor, acid, fuel oil and practically everything else connected with sheet manufacturing. Galvanized sheet prices range all the way from a basis of 4.50c for No. 28 gage where heavy gages are specified, to 5.40c, a seemingly prohibitive price asked by some makers for No. 28 gage. A range of 4.75c to 5c about represents the market. The flurry in the market has been injurious to demand, just as it was showing signs of renewed vigor.

Blue Annealed High

Cleveland, Dec. 7.—The sheet market in Cleveland is very strong with a local mill selling at 2.50c, Pittsburgh, for No. 10 blue annealed. There is considerable uncertainty as to the galvanized market, owing to the ups and downs of the spelter market.

Sheet Demand Heavy

Pittsburgh, Dec. 7.—Increased demand for steel sheets has led manufacturers to engage additional mill capacity. The American Sheet & Tin Plate Co. and independent manufacturers are driving mills at 90 per cent of capacity and above. Blue annealed sheets have been established at 2.25c base; No. 28 gage black sheets and No. 28 gage galvanized sheets are selling at 2.50c and 4.75c, respectively. Deliveries of steel sheets are deferred from six weeks to three months.

Another Advance Foreshadowed

Philadelphia, Dec. 6.—No further advances in the price of blue annealed sheets have been made by eastern Pennsylvania makers, but another rise is foreshadowed by the continuance of a heavy demand which the mills find difficult to meet. The price of 2.40c, Pittsburgh, or 2.559c, Philadelphia, for first quarter iron has become well established in the east. Most buyers are well covered for that period and there is some inquiry for second quarter, upon which makers are not yet ready to quote.

Not Seeking Sales

Cincinnati, Dec. 7.—Sheet mills in this district are not anxious for business, and are asking extremely high prices for either black or galvanized grades. A little spot business is being done, but mills are refusing to sell for extended deliveries. Mill prices on galvanized No. 28 gage range from 4.85c to 5c, and from 2.45c to 2.50c on black No. 28 gage, both Pittsburgh basis. Warehouse quotations are from 2.85c to 3c for black No. 28, and from 5c to 5.25c on galvanized No. 28 gage.

Coming Into Market

Youngstown, O., Dec. 7.—While tin plate consumers were startled by the sharp advance in prices for 1916 as asked over 1915, they are showing signs of recovering from their hesitancy and coming into the market, although many of the large packers are not covered yet. Little prompt business is being done, as most buyers still have some tonnage under their 1915 contracts against which they are specifying. The prompt market is on a level with next year's deliveries, $3.60 per base box, 100-pound coke, although a few sales at even higher prices are reported. Record export demand continues.

Tin Plate for Export

Pittsburgh, Dec. 7.—The American Sheet & Tin Plate Co. has booked an order for 100,000 boxes of tin plate for export to the far east at a price slightly above the domestic market. South American and far eastern countries have been figuring in the domestic market for several weeks. More important domestic consumers have covered requirements for the 1916 season. Some buyers were able to shade the prevailing $3.60 base price. As the end of the year approaches, it seems likely that tin plate prices will advance to $3.75, base.

(*For complete prices see page* 1154.)

Wire Prices

Are Firm—Advances in Horseshoes and Toe Calks

Pittsburgh, Dec. 7.—Advanced prices of wire products announced at the beginning of last week, have been adopted by all manufacturers in the Greater Pittsburgh district. Despite the fact that material now is commanding the highest prices to prevail for seven years, further price advances are expected. The price of galvanized nails was put up $5 a ton to $2.25 for galvanized nails, 1-inch and longer. Most mills are unable to offer tonnages for shipment in less than five or six months.

Manufacturers of cut nails have advanced quotations $1 and $2 a ton, now quoting $1.90 and $1.95 a keg, Pittsburgh. Demand for cut nails is heavy; further price advances are expected.

Horseshoes Higher

Cleveland, Dec. 7.—The wire market continues very strong. The only price changes noted are an advance of 25 cents on horseshoes, making the price $3.75 a keg, and an advance of 20 cents on toe calks, making the price $4.65 a keg. Very few wire contracts expire prior to Jan. 1. The unspecified tonnages are being rigidly cancelled.

Billet Inquiry

Includes 25,000 Tons for France—Forging Billets Scarce

Philadelphia, Dec. 6.—A new inquiry for 25,000 tons of small open hearth billets, shipment to be made 5,000 tons monthly, beginning in February, has been put before sellers by the French commission in New York. The buyers are experiencing difficulty in locating such a tonnage or in getting eastern makers, most of whom are out of the market, to quote at all. The local locomotive builder has inquired for an indefinite tonnage of 7 and 8-inch blooms for export. Eastern Pennsylvania steelmakers in the week declined offers of $55, mill, for forging billets, because they have nothing in this form for sale. The exact market on forging billets is difficult to define, but it probably is around $50 to $60, mill. Eastern Pennsylvania billetmakers now are talking $36, mill, on rolling steel.

Semi-Finished Higher

Pittsburgh, Dec. 7.—Billets and sheet bars continue their march toward

higher price levels. Leading producers are not offering material in the open market and published quotations necessarily are nominal, because of the absence of recent sales. Some people in close touch with the situation say neither billets nor sheet bars are obtainable at less than $30, mill. Forging billets have commanded as high as $55 a ton, Pittsburgh. Wire rods are scarce; they nominally are quoted at about $40, Pittsburgh. Muck bar is listed at $34, Pittsburgh.

Ferro Silicon

Is in Extraordinary Demand Due to Ammunition Orders

New York, Dec. 7.—An extraordinary demand for 50 and 75 per cent ferro-silicon, continues to mark the situation in ferro-alloys and plans are taking form for increasing the domestic production of this metal. A new operation at Baltimore is expected to be ready to become a market factor in January and it is understood another furnace is being added at Niagara Falls. The unprecedented demand for 50 per cent and higher ferro-silicon is caused by the heavy orders for ammunition steel which specify a high silicon content. About 10 times more silicon is required for munition steel than for ordinary mild steel. All the large buyers in this country who have requirement contracts expiring Jan. 1 have been specifying the maximum amounts and makers have had trouble to meet these demands because of the limited supply. There also has appeared a heavy inquiry for foreign delivery to the countries at war which sellers have been obliged practically to ignore. One seller estimates that there are 3,000 to 4,000 tons now in the market for export account. Prices of 50 per cent ferro-silicon, which recently jumped sharply to $83 to $85, Pittsburgh, or Philadelphia, are stationary, but it is difficult to get metal at these or at any figure.

There is a better inquiry for ferro-manganese and the market continues to show more firmness. The price of $100, seaboard, for first half, now is well-maintained and some premiums are being obtained on spot shipments. Among the inquiries now pending are two 1,000-ton lots for first half. Canada has out several inquiries, including one for 500 and another for 400 tons.

The past week's arrivals have been of heavier total. The DOMINION, with 750 tons, and the MANCHESTER EXCHANGE, with 250 tons, arrived at Philadelphia and the ROWANMORE is about to reach Baltimore with several hundred tons. The MALVERNE RANGE, which is expected to bring in the largest single tonnage in a number of months, probably 5,000 to 6,000 tons, has sailed from England within a few days. The spiegeleisen market is not so active.

Lower Grades Advanced

Pittsburgh, Dec. 7.—Lower grades of bessemer ferro-silicon were advanced $1 a ton again this week to $30, furnace, for from 12 to 13 per cent material. Silvery iron also was put up $1 a ton to $24.50, furnace, for 7 to 8 per cent silicon. The market for 80 per cent ferro-manganese shows no change in position. Demand for steelmaking metals continues heavy and decidedly attractive prices are being obtained by sellers.

Iron Ore Shipments

Are Ended on the Lakes—Not Far Behind Record Year

Ore shipments during December were 57,236 tons, making the total movement for the season 46,318,804 tons. The last ore cargo of the season was carried by the steamer JOSEPH WOOD from Superior on Tuesday. The figures show an increase of 14,296,907 tons over the movement of 1914 and are only short 1,116,973 tons of the movement of 1912, and 2,751,674 tons of the movement of 1913, which was the largest movement on record. In many ways, the movement of 1915 was the most phenomenal of all years, since the trade did not open until August and it reveals very conclusively what the lake fleet is able to accompish when it is called upon to extend itself.

Following were the shipments by ports, with corresponding data for the preceding year:

Port.	November, 1915.	November, 1914.
Escanaba	696,346	222,048
Marquette	263,386	104,147
Ashland	451,020	133,673
Superior	958,465	389,279
Duluth	1,328,848	121,248
Two Harbors	747,064	98,286
Total	4,445,129	1,068,681
1915 increase	3,376,448	.....

Port.	To Dec. 1, 1915.	To Dec. 1, 1914.
Escanaba	5,636,427	3,663,040
Marquette	3,099,589	1,755,726
Ashland	5,146,772	3,363,419
Superior	8,307,381	11,309,748
Duluth	15,437,419	6,318,291
Two Harbors	8,633,980	5,610,262
	46,261,568	32,020,486
1915 increase	14,241,082	.....

	Dec., 1914.	Dec., 1915.
Escanaba	1,411	12,862
Superior	.....	35,412
Two Harbors	.....	8,962
	1,411	57,236

According to the figures of the Lake Superior Iron Ore Association, Dec. 1, Lake Erie docks held 8,812,499 tons of ore as compared with 8,375,014 tons Dec. 1, 1914, and 9,250,500 tons Dec. 1, 1913.

During the season shipments of ore from Lake Erie docks amounted to 27,027,058 tons as compared with 17,650,073 tons in the season of 1914 and 26,125,758 tons in 1913.

Prices Will be Higher

New York, Dec. 7.—Prices for next season of New York and New Jersey iron ores, will be at least 75 cents to $1 a ton higher than last year, according to present indications. Some good-sized sales of furnace ore already have been made at higher than both 8½ and 8¾ cents per unit of iron delivered in eastern Pennsylvaina, or about 75 cents above last year and lump ore has been sold at the same advance. Other negotiations are under way and leading operators are expected formally to adopt schedules soon. The price for furnace ore may be as high as 9 cents per unit delivered eastern Pennsylvania. At this level, it still would be considerably below a 75 cent to $1 advance in lake ores, which, at the present season's schedule, have been on the basis of 8¼ cents per unit, delivered, for Messabi non-bessemer. The Bethlehem Steel Co. has been a large buyer of eastern ore. A recent transaction whereby about 100,000 tons of New Jersey ore were taken by an eastern Pennsylvania steel maker was an exchange for semi-finished steel and the price has only a remote bearing on next year's market.

Added Blooming Mills

Blooming mill capacity is being added to the pant of the Worth Bros. Co., Coatesville, Pa., by its new owners, the Midvale Steel & Ordnance Co. Heretofore, the Worth plant has contained no blooming mills and rolling of pates has been done direct from the ingots. Either one or two 28 or 30-inch booming mills will be added to the plant by the present management and this work now is under way. Other important extensions are in contemplation for the Worth Bros. plant but the plans for these have not yet been fully matured.

The United States Steel Corporation has announced that it has elected to accept the new workmen's compensation act of Pennsylvania, which goes into effect Jan. 1 next.

S. Fair & Son, Saginaw, Mich., operating a steel and iron foundry, have increased their capital stock from $20,000 to $75,000.

(*For complete prices see page* 1154.)

Scrap Prices Advanced

Higher Quotations in Leading Centers—Wrought Material Demand Active in East

New York, Dec. 7.—A sharp rise in wrought scrap has stood out in the old material market. Sales of No. 1 railroad are reported at over $20, delivered eastern Pennsylvania, and buyers have offered $18.50, delivered for city wrought or about $16.50, New York. Wrought pipe, however, has not moved. Eastern Pennsylvania steel mills still decline to bid for material against the high prices in the Pittsburgh district, from which offers of $17.50, delivered, equivalent to $14.75, New York, were made to eastern sellers in the week. Eastern Pennsylvania mills are not in the market at all for the time being, but brokers are offering up to $13.25, New York, and higher, for heavy melting steel for that district. Cast scrap is strong in this district. Stove plate is 25 cents higher for New Jersey delivery. For shafting, $20, delivered eastern Pennsylvania, is offered. The general tone of the market is one of strength.

General Advance

Philadelphia, Dec. 7.—A general advance of 50 cents to $1 a ton has been established this week in the eastern Pennsylvania scrap market and conditions are buoyant. The demand is good and covers all grades, but owners do not offer material very freely, as higher values are expected. No. 1 railroad wrought is rather the feature, having been sold at $18.50, delivered eastern Pennsylvania, while there are reports of $19 and higher having been done. The brokers continue the active buyers of heavy milling steel at $15.50 to $16, delivered, but the steel works remain out of the market. A dealer paid $14.50, Richmond, equivalent to over $17, delivered eastern Pennsylvania, for 2,500 tons of steel roadway scrap. Shafting has sold at $18.25, delivered eastern Pennsylvania, and steel axles are considerably higher.

Buffalo Sales 25,000 Tons

Buffalo, Dec. 7.—Scrap dealers in the Buffalo district placed fully 25,000 to 30,000 tons of heavy melting steel and other lines in the Pittsburgh and valley district in the past ten days with a few leading consumers covering their needs for the next two or three months. This has had a tendency to hold back further advances in prices. At the same time, inquiries for several large blocks of steel scrap aggregating fully 25,000 tons have come into the market. To offset this inquiry and its effect upon the market, several other consuming interests of large tonnages have for the time being placed an embargo on further consignments to them. Advances in prices are noted in railroad wrought, old steel axles, railroad malleable, cast iron borings, stove plate, No. 1 busheling scrap and bundled tin scrap. The latter being quoted at $12.

Climbs Upward

Pittsburgh, Dec. 7.—Demand for iron and steel scrap continues heavy, despite active buying the last few weeks. Heavy melting steel has commanded $18 a ton, delivered, and reports of sales at $19 are heard. Practically every melter in western Pennsylvania and eastern Ohio has figured in the market the last 30 days. All grades of old material are selling at from 25 cents to $1 a ton above prices prevailing a week ago.

Scrap Ranging Higher

Chicago, Dec. 7.—Iron and steel scrap continues to soar and large purchases by steel-making interests recently have strengthened the market materially. December usually is fairly quiet and some scrap dealers believe quotations will not be materially higher before the first of the year, although constant increase has not yet been checked.

Country dealers, who have been hoarding scrap for the last two or three years, are attracted to the market by present prices and considerable scrap from this source is expected to come into the market shortly. Any recession from present prices probably would precipitate a small avalanche of country holding, which may break the market.

Recent large sales of heavy melting steel are believed to be covered by purchases on the part of brokers and no considerable short interest is represented. Railroads are offering considerable accumulations, which have not affected prices. The Southern railroad offers 2,550 tons, the St. Louis Southwestern 920 tons, the Mobile & Ohio 879 tons, the Union Pacific 3,000 tons, the Baltimore & Ohio 14,000 tons, which include 4,000 tons of long steel rails, 1,500 tons of No. 1 wrought and 1,000 tons of wheels. The Grand Trunk offers 8,800 tons, the St. Paul 2,300 tons, the Kansas City Southern 220 tons, the North-Western 4,800 tons, the Santa Fe 3,700 tons and the Wabash 1,700 tons.

Heavy Scrap Strong

Cincinnati, Dec. 7. — The price of heavy melting scrap is keeping pace with that of pig iron, and the former is now quoted at from $14 to $14.50 per gross ton, which is one of the highest quotations ever realized on this grade in the local iron and steel scrap market. Shipments are heavy both to rolling mills and jobbing foundries. Bundled sheet scrap has advanced 50 cents a ton and is now given at from $8.50 to $9 per net ton. Stove plate is strong at from $8 to $8.50 per net ton, and cast borings have been advanced to from $7.50 to $8 per net ton. The best sellers in the market are heavy melting scrap, No. 1 cast, bundled sheet scrap, No. 1 busheling and stove plate.

Buying Freely

St. Louis, Dec. 7.—The scrap market has been steadier the last few days, and prices may have reached the top level, although this will depend much on the condition of the weather and the rapidity with which railroads dump their scrap on the market. Consumers are buying freely, as their stocks of raw material have been running low.

Relaying rails are in demand, and the supply seems to be rather limited, especially No. 1 class A rails. The railroad offerings before the market are: Kansas City Southern, 220 tons; Mobile & Ohio, 500 tons; Wabash, 1,700 tons; M., K. & T., 2,300 tons; Baltimore & Ohio, 17,500 tons; also an open list from the New York Central, but it is not expected that any of this material will get into this market.

(*For complete prices see page* 1154.)

Pipe Shows Improvement

Pittsburgh, Dec. 7.—New cards showing advances of $2 a ton for iron and steel boiler tubes, which first appeared Dec. 1, have been adopted by all makers in the Greater Pittsburgh district. Demand for boiler tubes is described as decidedly heavy. Seamless tubes also are very active. Merchant iron and steel pipe shows more snap and increased demand for oil country goods is reported. Advances in the prices of standard iron and steel pipe are expected.

The steel mills of the Tennessee Coal, Iron & Railroad Co., at Ensley, are working full time almost exclusively on shrapnel billets. Good rail business, however, is booked and prospects for operation of the plant are considered very good.

Prices on Shapes Vary

High Quotations on Standard Sections— Scarcity of 24-Inch Beams

New York, Dec. 7.—As building activity continues below normal in eastern districts as well as throughout the country, there continues a considerable diversity in the prices and deliveries of plain material between those mills which specialize primarily on shapes for such construction and those which receive tonnage from all classes of fabrication work. Special building sections may still be had from one eastern mill in four to six weeks' time and at from 1.70c to 1.80c, Pittsburgh. Other eastern mills quote considerably higher. One eastern Pennsylvania producer this week advanced current business to 2c, Pittsburgh, or 2.169c, New York, for deliveries ranging from three to 14 weeks, depending upon shape sizes. Small lots are quoted up to 2.25c, mill. The new tonnage in standard sections continues very heavy. Loft building work in this city for spring delivery is beginning to appear more freely. There still is some difference of opinion expressed as to the prospects for spring work, some predicting a large market and others that present high prices may restrain new enterprises. It is pointed out, however, that since the steel work in buildings amounts to but 15 to 20 per cent of the total cost, this factor is not a vital one.

Varied Prices in East

Philadelphia, Dec. 6. — Conditions among the structural shape makers of eastern Pennsylvania have reached the point where the latter are doing practically a merchandising business, making each transaction complete in itself and varied as to price, depending on the tonnage, buyer, delivery, point of shipment and other considerations. Some makers quote 2.00c, Pittsburgh, for shipment to eastern consumers, and 2.25c, mill, for western shipment, the delivery to be made as the mill is able or in six to eight weeks where the tonnage is extensive. These mills report that the new demand and specifications are heavy and they have no great trouble to obtain their prices. These makers have been avoiding contracts and have declined a large tonnage. On the other hand, one large eastern Pennsylvania maker of special shapes continues to promise deliveries in four to six weeks at 1.70c to 1.75c, Pittsburgh. The easier position of this maker is attributable to the below-normal volume of mercantile building work, for which its section especially is adapted. The quotations of other large shapemakers continue around 1.80c, Pittsburgh. There is a conspicuous scarcity of 24-inch beams and this section with slight fabrication was quoted this week at 3.00c, eastern mill. The Pennsylvania Steel Co., which recently inquired for 25,000 tons of forward shapes, has encountered trouble in getting quotations, as makers usually do not care to name prices except where specifications accompany the order. Bids closed this week on a 5,500-ton pier for the city of Philadelphia.

Shape Mills Sold Up

Pittsburgh, Dec. 7.—Manufacturers of structural shapes in the greater Pittsburgh district are unable to offer material for delivery in less than from five to seven months. While the 1.70c price has not been withdrawn officially, it does not represent the market, since mills will accept that figure only when buyers are willing to take material for delivery the latter part of the second quarter. Fabricators are operating shops at maximum capacity and most of them are not in position to take contracts specifying deliveries earlier than the second quarter of next year.

Selling at 2.25c, Mill

Cleveland, Dec. 7.—The Eastern Steel Co. is quoting 2.25c, mill, on shapes and is able to sell in limited quantities. Very few building projects are pending in this district at present, but shops are fairly busy.

Firm at Chicago

Chicago, Dec. 7.—Structural business the past week in the west has been large, railroads and ore companies furnishing most of the tonnage. In addition to previous large tonnages placed for improvements in ore-handling apparatus at the head of the lakes, two further items of this sort were closed recently. A small tonnage for the Pennsylvania railroad's freight house at Chicago was also placed. About 4,000 tons of structural steel for improvements at the Indiana Harbor plant of the Inland Steel Co. have been divided about equally between the Morava Construction Co. and the Kenwood Bridge Co.

CONTRACTS AWARDED.

Office building for the Oceanic Realty Co., Forty-second street and Fifth avenue, New York City, 2,000 tons, to Post & McCord, and fabrication will be done by the American Bridge Co.

Blooming mill and other buildings for Inland Steel Co., Indiana Harbor, Ind., 2,000 tons, to Kenwood Bridge Co.

Structural Mill building, warehouse and trestles for Inland Steel Co., Indiana Harbor, Ind., 2,000 tons, to Morava Construction Co.

Clay Products Co., buildings, Brazil, Ind., 813 tons, to Decatur Bridge Co.

Duluth & Iron Range R. R. Co., ore spouts for dock No. 6 at Two Harbors, Minn., 650 tons, to American Bridge Co.

Miscellaneous steel work for Pennsylvania R. R. Co.'s freight house, Chicago, 550 tons, to Hanke Iron Works.

Ore handling bridge for Pennsylvania R. R. dock, Erie, Pa., 435 tons, to Pennsylvania Steel Co.

Power house for the Buffalo General Electric Co., Buffalo, 2,000 to 3,000 tons, to the Lackawanna Bridge Co.

Machine shop extensions to the Midvale Steel Co., Philadelphia, 500 tons to unknown shop.

Buffalo General Electric Co.'s $2,000,000 steam-electric power generation plant, Buffalo, 2,000 tons to Lackawanna Bridge Co.

Union Carbide Co., plant addition, Sault Ste Marie, Mich., 600 tons, to American Bridge Co.

Pennsylvania Railway Co., Philadelphia, overhead electrification, 800 tons, to Lackawanna Bridge Co., Buffalo.

International Brewing Co., Buffalo, addition, 100 tons structural, to Buffalo Structural Co.

New Federal Postoffice, Salamanca, N. Y., 100 tons, to Buffalo Structural Co.

Pratt & Lambert Varnish Co., Buffalo, plant addition, 100 tons, contract to Buffalo Structural Steel Co.

American Radiator Co., Buffalo, Pierce plant, service building addition, 100 tons, to Buffalo Structural Steel Co.

CONTRACTS PENDING.

Bridge work for the Missouri, Kansas & Texas railroad, 1,500 tons, bids being taken.

McKean street pier for the city of Philadelphia, 5,500 tons, Snare & Triest low bidder on the general contract and the Pennsylvania Steel Co., it is reported, will furnish the steel.

(*For complete prices see page* 1154.)

Alton Plant is Purchased

St. Louis, Dec. 6.—The plant of the Alton Steel Co., at Alton, Ill., which went into the hands of a receiver 18 months ago, and was sold under foreclosure to H. C. Fownes, of Pittsburgh, has been purchased by the Laclede Steel Co., of St. Louis.

The arrangements for the purchase were completed last week according to Thomas R. Akin, president of the Laclede company, and the plant will be reopened early in January for the manufacture of steel bars and hoops. It will have an annual capacity of about 60,000 tons and will employ several hundred men.

The Laclede Steel Co. has a capital of $400,000, most of which is held by St. Louis interests. It operates a plant at Madison, Ill., which is somewhat smaller than the plant at Alton.

Bonner Drop Forge Co., Danville, Ill., has increased its capital stock from $5,000 to $750,000.

Are Forced to Buy Cars

Pennsy Provides for a Part of Its Requirements —Other Lines Place Orders

New York, Dec. 7.—Pressing needs of equipment, as was expected, have forced the Pennsylvania railroad to buy cars under its recent inquiry, which it had held in abeyance in an unsuccessful effort to induce lower quotations from the steel makers. This system now has closed for 1,075 gondolas with the American Car & Foundry Co. and for 1,075 gondolas with the Haskell & Barker Car Mfg. Co., all for the lines west. It still is negotiating and is expected to make other awards soon, especially for the lines east. Its original inquiry was 11,000 cars.

The Delaware, Lackawanna & Western has placed 1,000 box cars with the American Car & Foundry Co.; the Western Maryland, an additional 1,000 hoppers with the Pullman Co., making 3,000 in all; the Ray Gila Valley railroad, 50 ore cars and the New Jersey Zinc Co., ten general service cars, both with the Pressed Steel Car Co., which also recently took 1,000 hoppers from the Central of New Jersey. The New Haven ordered 100 passenger cars from the Osgood-Bradley Co. New inquiries include 1,000 hoppers for the Chesapeake & Ohio; 550 hoppers and 200 flats for the Lehigh & New England; 300 coal, 100 gondolas and 50 ballast for the New York, Ontario & Western, 30 to 60 coaches for the New York Central and 21 for the Missouri, Kansas & Texas.

Transportation Companies Buy

The Interborough Rapid Transit Co. is inquiring for 4,500 tons of 90 and 100-pound running and for 3,000 tons of contract rails. The Carolina, Clinchfield & Ohio has placed 1,000 tons additional with the Carnegie Steel Co. The recent Southern Pacific order amounted to 14,000 tons and will be filled by the Tennessee Coal, Iron & Railroad Co. The Burlington is reported to have placed 15,000 tons additional with the Colorado Fuel & Iron Co. Italy is in the market for several thousand tons. A steel export company is inquiring for about 70,000 kegs of railroad spikes for shipment abroad. The Clover Leaf is inquiring for 5,000 tons of rails and desires an option on 5,000 tons additional.

In locomotives, the H. K. Porter Co. has received 25 more from Russia and has just completed a shipment of 50. The American Locomotive Co. has taken six for the Monongahela railway, six for the Cincinnati, Indianapolis & Western, three for the Detroit Terminal and one for the Solvay Process Co.

Light Rails Advanced $2

Pittsburgh, Dec. 7. — The Carnegie Steel Co. and other makers of light steel rails have advanced prices $2 a ton to 1.55c for sections weighing from 25 to 45 pounds, inclusive. Domestic demand is described as heavy and considerable tonnage is being exported for portable tracks in the war zones of Europe.

Standard railroad spikes are being held at 2.10c and smaller sizes are commanding 2.25c and above.

Steel Cars Ordered

The Pittsburgh Railways Co. has awarded contracts for 190 steel cars, including 75 all-steel low floor center opening motor cars, awarded to the Cincinnati Car Co.; 50 low floor motor cars and 50 low floor trail cars, awarded to the St. Louis Car Co. and 15 all-steel interurban cars, awarded to the J. G. Brill Co.

The November tonnage at the Rankin, Pa., plant of the McClintic-Marshall Co., Pittsburgh, was 1,100 tons in excess of the previous highest output of the plant.

Last of Order

Indianapolis, Dec. 8.—The Vandalia Railroad Co. has received the last of an order of 10 220-ton locomotives of a class known as the "H-10", to be used in freight business. The engines are equipped with automatic stokers. They cost $20,000 each. Officials of the road declared heavier engines are in demand because the more general use of steel freight cars has made trains much heavier.

Will Spend Two Millions

Indianapolis, Ind., Dec. 7.—The Cincinnati, Indianapolis & Western Railroad Co. will spend more than $2,000,000 for new equipment, according to an announcement made last week by B. A. Worthington, president, who recently established headquarters in Indianapolis. The company shortly will take over the control of the Cincinnati, Hamilton & Dayton. The money for new equipment will be procured from a $3,500,000 bond issue recently authorized. The equipment will include locomotives, freight and passenger cars. About $100,000 will be spent in strengthening bridges and equipment will be purchased as follows: Eight Mikado engines, 10 consolidation through freight engines, five small passenger engines and 10 small local freight engines, 50 stock cars, 200 gondolas, 50 hopper cars, 80 flat cars, 350 box cars, 20 cabooses, three steel postal cars, and about 30 steel cars for passenger service.

(*For complete prices see page* 1154.)

Warehouse Prices

Are Again Moved Up—Advance of $7 in Large Rounds

Cleveland, Dec. 7.—Further advances in warehouse prices are $7 per ton on rounds 2 inches and larger and $2 on shapes, plates, iron and steel bars. The price on squares above 2 inches remains at 2.65c. The price on large rounds was advanced to 3c on account of the tremendous demand due to war business. Stocks on hand in warehouses are limited. The only kind of steel product that is not moving rapidly from warehouses is galvanized sheets. Cleveland warehouses made high records last month.

Cast Pipe Higher

Advance at Chicago, Where Bids for Large Tonnage Are Opened

Chicago, Dec. 7.—An advance of 50 cents per ton has been made on cast iron pipe in Chicago, 4-inch now being quoted at $29.50 and 6-inch and larger at $27.50. A further advance is probable within a short time.

Cities are beginning to take more interest in their supplies for next year. Figures will be opened Dec. 9 at Minneapolis on 2,250 tons. Bids were opened at Chicago, Nov. 30 and Dec. 1, on about 19,000 tons, the United States Cast Iron Pipe & Foundry Co. making the lowest price on 11,325 tons of 12-inch to 48-inch pipe, while three lots of 4-inch to 12-inch, aggregating 7,500 tons, probably will be awarded to the American Cast Iron Pipe Co., the Lynchburg Foundry Co. and the Glamorgan Pipe Co., each being low on one lot.

Bids on Subway

New York, Dec. 7.—Booth & Flynn, Pittsburgh, today submitted the lowest bid for the construction of a subway tunnel under the East river at Fourteenth street, this city, which calls for 43,000 tons of cast iron segments. Deliveries of these segments will extend over about a year and a half.

B. S. Constant Mfg. Co., Bloomington, Ill., has increased its capital stock from $30,000 to $50,000.

New President

And Other Officers Elected by Mechanical Engineers

New York, Dec. 8. — The annual meeting of the American Society of Mechanical Engineers held it first session yesterday, which was featured by the annual address of Dr. John A. Brashear, president, on "Science In Its Relation to Engineering". The scholarly address was followed by the introduction of the president-elect, Dr. David Schenck Jacobus, a biographical sketch of whom appears elsewhere in this issue, and this ceremony was followed by a reception to the president-elect, ladies, members and guests. The annual dinner will be held Thursday evening at the Hotel Astor. There will be professional sessions Thursday morning and Friday morning.

In addition to the new president, the officers of the society for 1915-1916 are: Vice presidents, Wm. B. Jackson, Chicago, J. Sellers Bancroft, Philadelphia, and Julian Kennedy, Pittsburgh; managers, John H. Barr, New York, John A. Stevens, Lowell, Mass., and H. de B. Parsons, New York. Wm. H. Wiley was re-elected to the office of treasurer.

British Prices

Are Much Higher—Billets Shipped With Sugar Are "Sticky"

Birmingham, Eng., Nov. 26.—The upward movement in pig iron has had a great impetus this week, Cleveland prices having advanced 4s (96 cents) per ton during the week making the present selling price 73s ($17.52) with an additional 8d (16 cents) for one month and 74s ($17.76) for three months. There is some eagerness to buy in that district. The present prices are the highest since the boom of 15 years ago, when the maximum of 78s ($18.72) was reached.

Finished Material

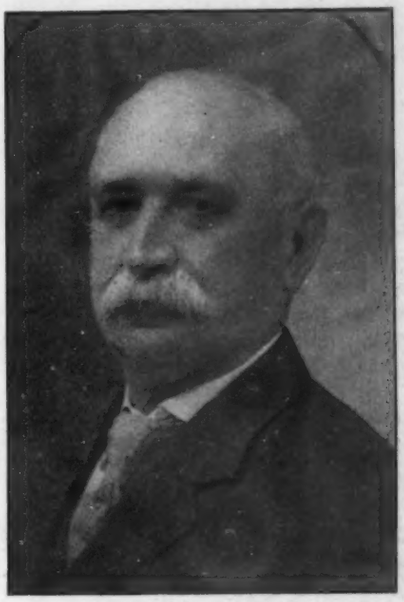
Increases in finished material all along the line have again to be recorded. There is scarcely an item on the list that has not materially advanced during the week. Some of the increases are striking in amount. Galvanized sheets head the list owing to a great rise in spelter values. This metal now sells at £100 ($480) a rise of about £18 ($38.40) on the week, and this has compelled makers of galvanized sheets to increase their quotations up to £24 ($115.20) per ton. Some makers ask £26 ($124.80) and there is no anxiety to sell. Apparently, only one firm at the Birmingham meeting was inclined to accept business. The high price of sheet bars has increased the value of black sheets for which £15 ($72) is demanded. An extra of £1 ($4.80) is charged for painting, where this kind of non-corrosive coating is preferred to spelter.

Apropos of billets, *The Iron Trade Review* is asked by an importer to mention that some of these have been carelessly packed, in some cases mixed up with sugar packages, so that the billets arrived in a very sticky condition. No doubt, a great many importers would not trouble about this if they could get American material.

Long Idle Stacks

Will be Placed in Operation by the Carnegie Steel Co.

Pittsburgh, Dec. 8.—The Carnegie Steel Co. has prepared the Edith and Neville Island blast furnaces for the torch and both stacks may be blown in after Jan. 1. The Neville furnace has not been operated since its acquisition by the Carnegie company, about eight years ago, and the Edith furnace has been idle for six years. The company is operating 50 of its 59 stacks.



EDWARD SMITH

Negotiations have been opened for 5,000 tons of basic iron for first half delivery by a consumer in this district. The Westinghouse Machine Co. has taken several thousand tons of miscellaneous foundry grades for first half shipment to its East Pittsburgh and Attica plants. The A. Garrison Foundry Co., Pittsburgh, has closed for 1,000 tons of foundry iron for shipment before July 1. Scattering sales of foundry iron the last few days aggregate 10,000 tons, most of which commanded $18, furnace. Some foundry iron sold at $18.50, valley.

Six Millions

Will Be Expended by Midvale Company for New Construction

New York, Dec. 8. (By wire.)—The Midvale Steel Corporation officially announces plans for extensions costing $6,000,000. These will include one 500-ton blast furnace with equipment for a second furnace, eight, 12 and 15-inch bar mills, steel tire, wheel rolling and machine shop forging department, all at Coatesville, and miscellaneous improvements of Nicetown works, costing $500,000. In addition, Coatesville extensions will include, as previously announced, six 50-ton open hearth furnaces and a blooming mill. The company officially today announces the purchase of the Buena Vista ore lands in Cuba.

Death of Edward Smith

The comparatively sudden death of Edward Smith, president of the American Ship Building Co., and one of the best known shipping men on the Great Lakes, which occurred Dec. 5, at his home in Buffalo, was a distinct shock to his large circle of friends. Mr. Smith had headed the American Ship Building Co. for a little more than a year, having previously been identified, among many important interests, with the Great Lakes Towing Co., as its president. Taken ill in Cleveland two weeks ago, he at once returned to his home, where he succumbed to acute heart disease.

Mr. Smith was the son of a German revolutionist, one of the famous Forty-eighters, who also died recently, almost a centenarian. The son was born in Germany 70 years ago. His first position was with the Bennett Elevator Co. After several years in a marine supply business, he became affiliated with Brown & Co., vessel agents, as managing partner, remaining with this firm from 1884 until 1904. During this time, Mr. Smith performed an important service to the shipping industry by his work in systematizing the methods of insuring lake vessels and cargoes. A little more than 10 years ago, he was elected president of the Great Lakes Towing Co., succeeding Harry Coulby. The rapid development of that company is largely credited to his untiring efforts and great ability. Mr. Smith was also one of the founders in 1901 of the famous Counselman's Line, plying from Chicago to Trans-Atlantic ports, with four vessels. In September, 1914, he was chosen president of the American Ship Building Co., resigning as head of the Great Lakes Towing Co.

Gain in Pig Iron Output is Small

Average Daily Production in November Exceeds October by Narrow Margin—Total Output for 1915 Will Be 30,000,000 Tons

ALTHOUGH the blast furnaces of the country established a new record for the average daily production of coke and anthracite pig iron, last month, the increase was the smallest of any month since the upturn began in December, last year. Many of the furnaces have been driven at capacity for some length of time and necessarily must be blown out shortly for relining. For these reasons, it is apparent that while pig iron production may continue to mount, the furnaces are slowly approaching their maximum production.

MONTHLY PRODUCTION.

	1915.	1914.	1913.
January	1,591,024	1,879,336	2,787,800
February ..	1,666,592	1,888,607	2,578,670
March	2,046,280	2,341,551	2,762,823
April	2,114,518	2,261,501	2,754,353
May	2,255,157	2,097,019	2,816,825
June	2,369,932	1,904,566	2,616,883
Total 1st half	12,043,503	12,372,580	16,317,354
July	2,563,311	1,955,324	2,558,275
August	2,774,825	1,996,483	2,537,018
September ...	2,834,342	1,882,718	2,494,098
October	3,120,340	1,767,227	2,539,924
November ..	3,035,235	1,501,269	2,229,960
December		1,495,325	1,976,138
Total 2d half		10,598,346	14,335,413
Grand total	26,371,556	22,970,926	30,652,767

The actual output of coke and anthracite pig iron last month was 3,035,235 tons, compared with 3,120,340 tons in October, a loss of 85,105 tons. The average daily record, however, was higher during November, owing to the shorter month. During last month, the furnaces averaged a daily output of 101,174 tons, compared with 100,656 tons in October, a gain of 518 tons. This gain was due largely to the increase in the number of active merchant furnaces. The daily production of merchant iron during November averaged 26,329 tons, against 25,919 tons in October, a gain of 410 tons. The steel works, or non-merchant furnaces, averaged a daily output during November of 73,883 tons, compared with 73,733 tons in October, a gain of only 150 tons.

The total output of merchant iron last month was 789,864 tons, compared with 803,483 tons in October, a loss of 13,619 tons. The total output of the steel works furnaces was 2,216,499 tons in November, against 2,285,721 tons in October, a loss of 69,222 tons.

A net gain of nine in active stacks was made, comparing the last days of November and October, the figures being 285 and 276. The record of active stacks is the best since May, 1913, and compares favorably with the high mark of recent years set in February, 1913, at 306. Comparing last month with November, 1914, the low point in stack activities of last year's decline, a gain of 135 stacks, or 90 per cent, is shown. In all, 10 merchant furnaces were relighted last month and two were blown out, a net gain of eight. Six steel works furnaces were blown in and five put out, a net gain of one.

The rate of pig iron production maintained during November would mean an annual output of 36,900,000 tons, which compares with an actual production of 23,000,000 tons in 1914. Including charcoal iron, the production of pig iron in 1915 will be 30,000,000 tons. Comparing last month with November, 1914, a gain of 1,534,000 tons, or 102 per cent, is shown.

The output of ferro last month was 18,678 tons, compared with 20,790 tons in October, a loss of 2,112 tons. The production of spiegel in November was 10,194 tons, against 10,346 tons in October, a loss of 152 tons.

The merchant furnaces blown in last month were: Pioneer No. 3, Republic Iron & Steel Co., Nov. 3; North Birmingham No. 3, Sloss-Sheffield Steel & Iron Co., Nov. 26; Bessemer No. 3, Tennessee Coal, Iron & Railroad Co., Nov. 30; Union, Rogers, Brown & Co., Nov. 19; Fannie, M. A. Hanna & Co., Nov. 20; Colebrook No. 1, Lackawanna Iron & Steel Co., Nov. 9; Temple, Temple Iron Co., Nov. 24; Saucon No. 10, Thomas Iron Co., Nov. 1; Rockwood No. 2, Roane Iron Co., Nov. 15, and Bay View No. 2, Illinois Steel Co., Nov. 10. Those blown out were: Crumwold, Reading Iron Co., Nov. 12, and Rockwood No. 1, Roane Iron Co., Nov. 13.

The steel works furnaces blown in were: One South Chicago, Wisconsin Steel Co.; Maryland No. 2, Maryland Steel Co., Nov. 22; one Duluth, Minnesota Steel Co., Nov. 30; two Columbus, Carnegie Steel Co., and Rebecca, leased by the Jones & Laughlin Steel Co., Nov. 9. Those blown out were: Alabama City, Gulf States Steel Co., Nov. 15; Joliet No. 3, Illinois Steel Co., Nov. 1; Maryland No. 1, Maryland Steel Co., Nov. 15; one Edgar Thomson, Carnegie Steel Co., and Harriet "X", Wickwire Steel Co., Nov. 26.

The furnace blown in by the Minnesota Steel Co. is the first of the two new stacks recently completed. The second furnace will be put in operation shortly. The Rebecca furnace, leased by Jones & Laughlin Steel Co. from Kittanning Iron & Steel Co., is making ferro-manganese.

AVERAGE DAILY PRODUCTION.

	1915.	1914.	1913.	1912.
January	51,323	60,624	89,929	66,220
February	59,521	67,450	92,095	72,372
March	66,009	75,534	89,123	77,791
Apr.	70,484	75,383	91,812	79,254
May	72,747	67,646	90,865	80,753
June	78,998	63,486	87,229	81,125
July	82,687	63,075	82,525	77,502
August	89,510	64,403	81,839	80,650
September	94,478	62,757	83,137	81,482
October	100,656	57,007	81,933	86,569
Nov.	101,174	50,042	74,322	87,985
December		48,236	63,746	89,590
Average	78,957	62,934	83,980	80,124

NOVEMBER PIG IRON.

States.	No. of stacks.	No. in blast last day of month. Nov.	Oct.	Total tonnage made. Merchant.	Non-Merchant.	Totals— Nov.	Oct.
Pennsylvania	155	119	116	213,415	1,088,725	1,302,140	1,353,252
Ohio	73	59	56	176,691	501,606	678,297	687,168
Alabama	45	26	24	145,327	63,537	208,864	212,805
Virginia	22	7	7	28,913	.....	28,913	26,161
New York	26	18	19	95,600	91,272	186,872	198,140
New Jersey	6	1	1	6,022	.....	6,022	3,703
Illinois	26	20	20	33,749	252,484	286,233	293,503
Colorado	6	2	2				
Indiana	10	10	10	30,192	191,745	221,937	229,689
Maryland	4	3	3				
Wisconsin	6	5	4				
Kentucky	7	3	3				
West Virginia	4	3	3	30,940	27,130	58,070	56,789
Tennessee	18	5	5				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	2	2	1	29,015	.....	29,015	27,994
Michigan	3	2	2				
Missouri	1	0	0				
Spiegel—All states...						10,194	10,346
Ferro—All states....						18,678	20,790
Totals	420	285	276	789,864	2,216,499	3,035,235	3,120,340

Kennedy's Dream Picture

Attracted Donner to Buffalo—New Company Formed to Enlarge and Conduct New York State Steel Co.'s Plant

Buffalo, Dec. 7. — Steps have been completed to incorporate the Donner Steel Co., Inc., with a capital stock of $5,000,000. The Buffalo chamber of commerce has been authorized to announce that William H. Donner, of Philadelphia, who recently purchased the plant and property of the New York State Steel Co. from the bondholders' committee, is to reopen the large plant about Feb. 1 of next year, improvements to cost $3,500,000.

Mr. Donner has had a number of engineers and experts, prominent in the steel and iron industry of the country, engaged at the plant since its purchase, working out the details of the improvements and extensions to be made.

Mr. Donner is to be president of the new company. The other officers and directors will be announced when the incorporation is completed.

The capital stock will be $2,500,000 common and $2,500,000 preferred.

The plans of the new company include the building of extensive ore docks, 1,200 feet in length along the company's frontage on the Buffalo river to the south of the Abbott road. The company will erect a by-product coking plant at an expenditure of fully $1,500,000. Machinery for this plant has been ordered by Mr. Donner. The immediate additions to the plant also include an additional large blast furnace. A second may be added later—according to Mr. Donner.

The experts engaged by Mr. Donner are working on the details of a steel mill addition to the plant. Just what form of finishing mills will be added will be announced later.

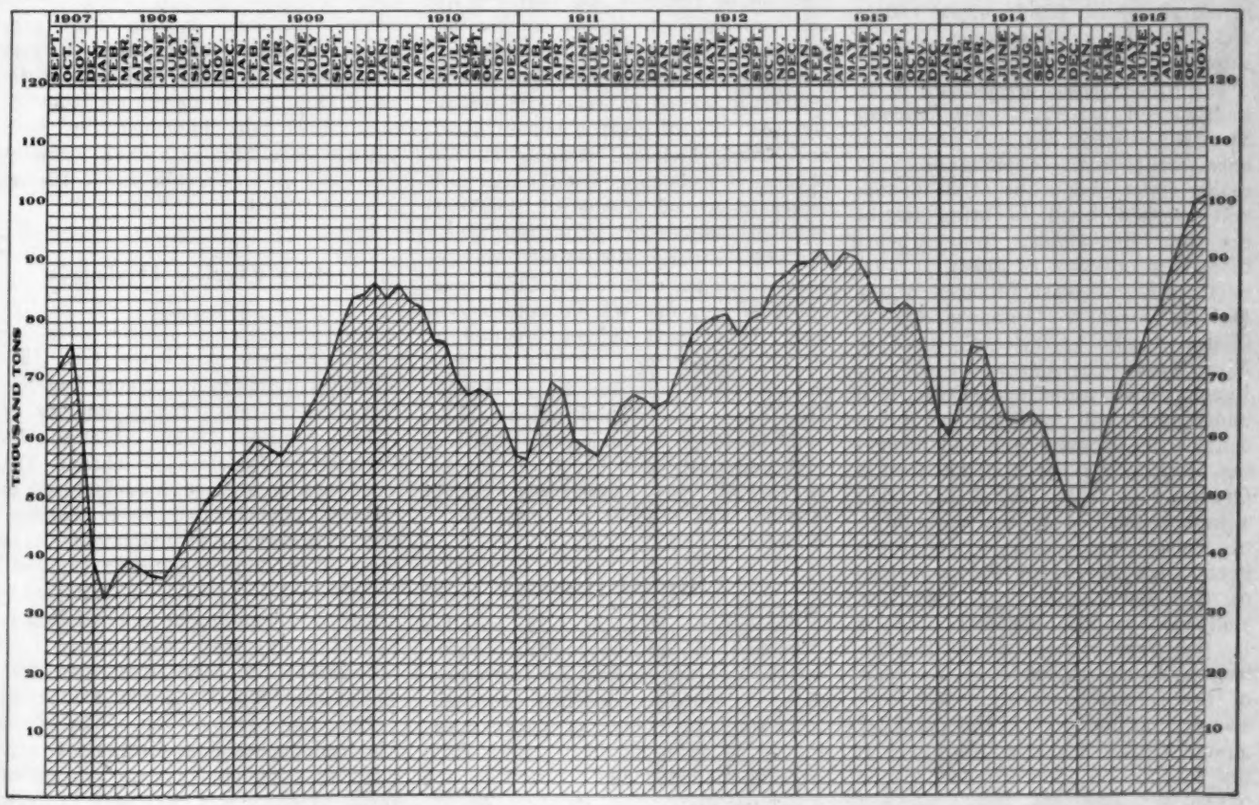
"There is absolutely no doubt that Buffalo possesses advantages as a center for steel and iron industries not possessed by any other point in the United States," said Mr. Donner, at a luncheon of the Buffalo chamber of commerce this afternoon.

Mr. Donner was brought to the meeting by Frank B. Baird and Frederick C. Slee, counsel for the new steel company, and after Mr. Donner's application for membership in the chamber of commerce had been secured, he was called upon for a speech. He said his coming to Buffalo was traceable to a dinner over a year ago of the American Iron and Steel Institute, at which Hugh Kennedy of this city was called upon by the toastmaster to give expression of his dream of Buffalo's greatness 50 years hence.

"Mr. Kennedy said at that time Buffalo would at the end of 50 years because of its advantages, its location on the Great Lakes with reference to the sources of ore supplies, and through the city's facilities to get its products to the great markets of the east and at tidewater, become the center of the steel and iron industry of the country," said Mr. Donner. "In this dream picture Mr. Kennedy pointed to the completion of the barge canal across the state as a factor in bringing about this great development.

"That talk of Mr. Kennedy's interested me in Buffalo because I knew he was no dreamer. Then recently someone called me up on the long distance telephone and said there was a steel plant to be obtained in Buffalo. I decided to come to your city to look over the plant and also to satisfy myself that Mr. Kennedy's dream would become a reality.

"Well, the negotiations for the property were taken up with the bondholders' committee, and after I found also by telephone that I could get a supply of ore shipped down the lakes, the deal was closed, today, by the way, I had occasion to use the telephone again to order all the machinery that will be necessary for the additional blast furnace we are going to construct at once."



AVERAGE DAILY PRODUCTION OF COKE AND ANTHRACITE PIG IRON

Cuban Ore

Acquired by Midvale Company—Very Large Tonnage

By the exercise of an option given several months ago, the Midvale Steel & Ordnance Co. has acquired the iron ore properties of the Buena Vista Iron Co. of Cuba, representing a deposit reported to contain about 300,000,000 tons of high grade ore. When the Midvale Steel & Ordnance Co. was formed, in October, President W. E. Corey announced that options had been taken on ore lands containing 300,000,000 tons of mineral. No further information as to the location, present condition of the property, or character of the ore was given at that time. Within the past few days, the transaction has been terminated and the new owners now are in control. The properties of the Buena Vista Iron Co. of Cuba are located on Nipe bay on the north coast of Cuba, almost directly across the island from Santiago, and are included in what is known as the Mayari district. In the Mayari district are located the north coast operations of the Spanish-American Iron Co., a subsidiary of the Pennsylvania Steel Co. The ore is of special quality and is particularly adapted to the manufacture of high grade steel, especially where nickel is required. A typical analysis of the ore in the dried state approximates 56 per cent in metallic iron, 4.00 in silica, 1.00 in nickel, 0.018 in phosphorus, 0.15 in sulphur and 3.00 in moisture.

The properties at present are in an undeveloped state and the Midvale Steel & Ordnance Co. will proceed at once to their active exploitation. One report states that a line of steamships will be established to bring in the ore to Philadelphia, from whence there is a rail haul of about 60 miles to the present blast furnaces of the Midvale Steel & Ordnance Co. at Coatesville, Pa. Charles F. Rand, of New York City, president of the Buena Vista Iron Co. of Cuba, it is understood, will continue as president of the company and will manage the property for the Midvale Steel & Ordnance Co. Mr. Rand has taken a leading position in the exploitation of Cuban ore resources for many years. He developed the properties of the Spanish-American Iron Co., and, subsequently, disposed of them to the Pennsylvania Steel Co., but has continued to serve as president of the former company. Mr. Rand also is president of the Ponupo Manganese Co., which operates mines in the Daiquiri or south coast district of Cuba. This ore has been sold upon the market in recent years.

The accession of the Midvale Steel & Ordnance Co. to the list of Cuban iron ore operators, will make four active companies on the island. These are: The Spanish-American Iron Co., which operates mines, both on the south and north coasts; the Juragua Iron Co., controlled by the Bethlehem Steel Co., on the south coast, and the Ponupo Manganese Co. on the south coast. The Eastern Steel Co. controls undeveloped ore lands not far from the properties of the Buena Vista Iron Co., and there is some talk that these may be acquired by the Midvale Corporation, but it is denied that any negotiations are under way.

Iron and Steel

Would be Taxed Hundred Million According to President's Plan

Washington, Dec. 7.—That it is the plan of the administration to have the iron and steel industry stand a substantial part of the cost to enact its preparedness program was made evident today by the President in his address before a joint session of the sixty-fourth congress. The entire program, extending over a period of five years, would involve the expenditure of $500,000,000. Of this sum at least $100,000,000 would come from taxation on pig iron and steel alone. It is not improbable that other plans of taxation on branches of the iron and steel industry will be suggested, if not by the administration, by members of congress.

In his address, the President recommended a tax of 25 cents per ton on pig iron, and 20 cents a ton on fabricated steel, doubtless, meaning all finished steel, estimating that through each source, an annual revenue of $10,000,000 could be raised, or $20,000,000 yearly for both, making $100,000,000 for five years, or 20 per cent of the entire revenue it is estimated will be necessary to enact the national defense program as outlined by Secretary of War Garrison and Secretary of the Navy Daniels. The sums the administration thinks could be raised by taxing pig iron and steel apparently are based on present production, and necessarily would fluctuate with changes in production.

Don't Like It

Pittsburgh, Dec. 8. (By wire.)—President Wilson, in making recommendations for raising funds to provide for heavy additional expenditures outlined in his message, exposes himself to a broadside of attack from iron and steel manufacturers in the greater Pittsburgh district. The action on the proposed internal taxes is favored by manufacturers of Pittsburgh as appproached by *The Iron Trade Review* this morning. "It is preposterous", "it is discriminatory" and "an increased burden on manufacturers and consumers" are some of the terms employed by leading members of the steel and allied trades, expressing themselves in regard to proposed methods of thus increasing the revenue.

Opposition

Has Already Developed to Proposed Tax on Iron and Steel

Washington, Dec. 7. (By wire.)—The proposal of the administration to assess a tax on pig iron and "fabricated steel", set forth in the President's address to congress yesterday, promises to meet with strong opposition. Not only many Republican members of congress but also some Democrats have taken the position that it is an unjustified tax on production and one which would throw an extremely heavy burden on iron and steel interests in the way of raising revenue for the preparedness program and in effect would be an embargo on industry. The belief grows that the suggestion was adopted as a substitute for the well known plan to tax manufacturers of munitions of war. Inability to define what constitutes such munitions is declared to have proven a difficult problem, causing such proposed tax to be abandoned. It may be, however, that the plan will be revived, but it is significant that of some 3,000 bills introduced in both houses since Monday, when congress convened, not one calls for a tax on war munitions.

Lathe Order Quickly Placed

The Factory Appliance Co., Illuminating building, Cleveland, has just received an order for a number of 16-inch engine lathes through its Paris agent, for shipment abroad. The purchaser is a large manufacturer of railway supplies and it is believed that this order is an indication of the kind of machinery business that will be obtained by American manufacturers if the negotiations are handled in a proper manner. The order was obtained in a little less than two weeks after the Paris agent received prices and information. The data, illustrations, weights, dimensions, etc., were so complete that no cabling or further inquiry was necessary in order to place the business.

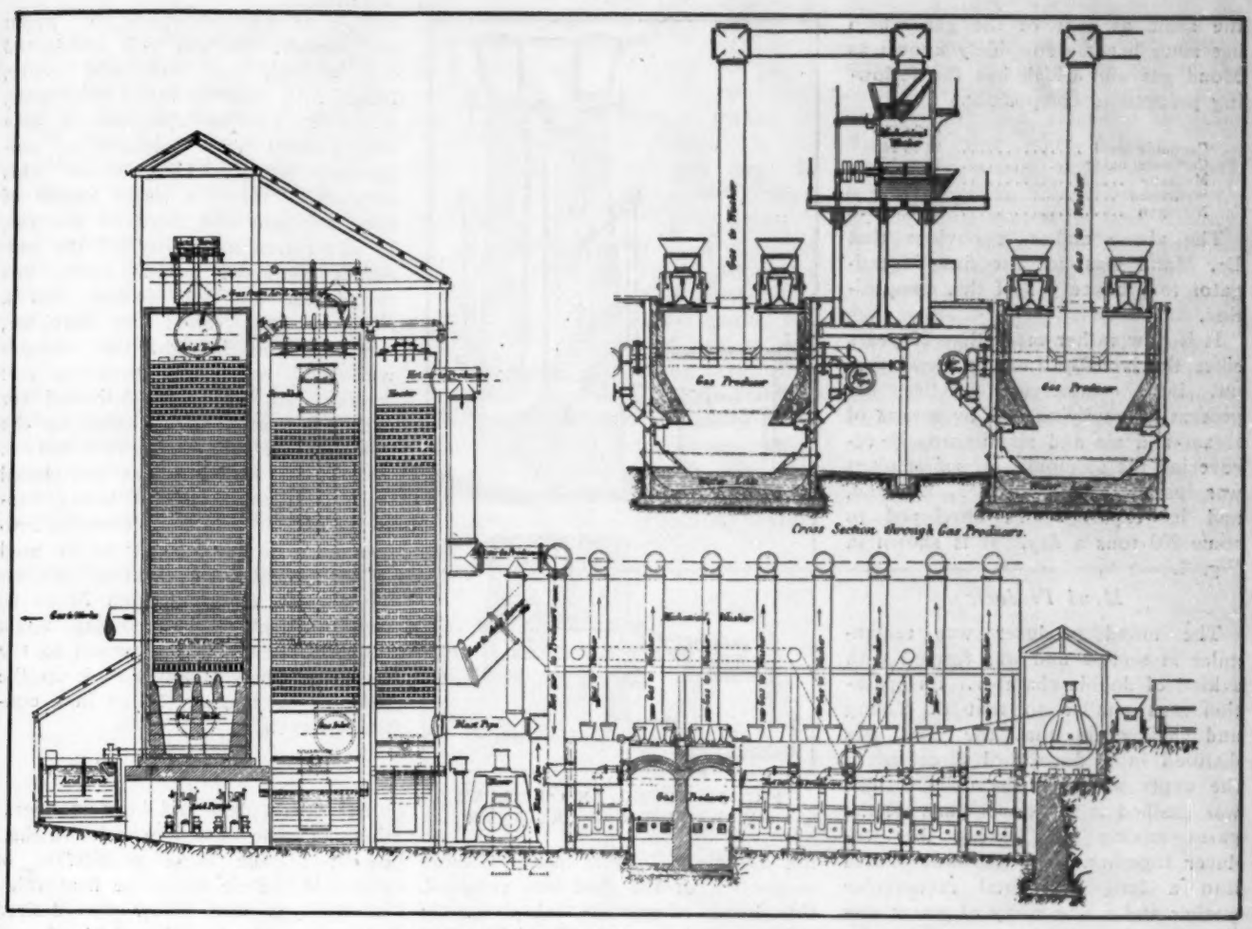


Fig. 1—Mond System Producer Gas Ammonia Recovery Plant

By-Product Coal Gas Producers

THE AUTHOR of this interesting article is one of England's foremost authorities on coal gas problems. He presents a historical resume of the development of the by-product producer gas industry in Europe, with descriptions of various inventions and improvements, including the researches of Young and Beilby and the plants developed by Mond, Duff, the Crossleys and others. The author's own apparatus is also shown.

By Arthur H. Lymn

THE art of generating producer gas from coal is a very old one, but the development of the simultaneous recovery of the valuable by-products is comparatively recent, having been confined to the last twenty-five years or so. Earliest attempts in Europe to recover the by-products of the producer gas process are generally recognized to have been made in Great Britain. In that country the knowledge that the treatment of fuel by a mixture of steam and air, the former in excess, would convert a large percentage of the nitrogen contained in the coal into ammonia, was first applied in practice on a large scale. The details of a plant to operate on this principle had already been worked out by Messrs. Young and Beilby in England and Grouven in Germany, among other investigators. The gas producer designed by Young and Beilby differed in operation from the ordinary by-product gas producer, in that it was heated from the outside. The coal was distilled in the upper part of the producer or retort and the tar vapors passed down through red hot coke and were, it was claimed, decomposed into permanent gas and ammonia. The coke in the lower half of the producer was burned in a mixture of steam and air, and the resulting gases, together with the gaseous products of the coal distillation, passed out of the producer by way of exits at the middle. The arrangement is illustrated in Fig. 2. It is particularly interesting to note that, as far back as 1883, Young and Beilby claimed to recover in the form of ammonia from 60 to 70 per cent of the total nitrogen in the fuel and that the percentage composition of their gas was as follows:

	Per cent.
Carbonic acid	16.6
Carbonic oxide	8.1
Methane	2.3
Hydrogen	28.6
Nitrogen	44.4

Although their retort was heated from the outside instead of the air and steam blast being superheated, it will be seen that the results claimed by them as to ammonia were not far short of what we realize today. The gas composition, too, was practically

A paper read at the annual meeting, Dec. 7 to 10, 1915, of the American Society of Mechanical Engineers, New York City.

the same as that of the gas which has since become so widely known as Mond gas and which has the following percentage composition:

	Per cent.
Carbonic acid	14 to 16
Carbonic oxide	10 to 12
Methane	2 to 3
Hydrogen	25 to 29
Nitrogen	Difference

The above makes it obvious that Dr. Mond was not the first investigator to produce gas of this composition.

It is now rather more than 25 years since the late Dr. Ludwig Mond first put into commercial practice the process of gasifying fuel by means of steam and air and simultaneously recovering the ammonia. His first plant was installed at Northwich, England, and its capacity was developed to some 200 tons a day. It is shown in Fig. 1.

Mond Producer

The mond producer was rectangular in section and was formed with a kind of double chamber. Its operation was similar to that of Young and Beilby, in that the coal was distilled in a downward direction in the upper part and the coke residue was gasified in the lower part, all the gases mixing and leaving the producer together. The gas was passed into a long horizontal rectangular washer and a fine spray of water was thrown into it by a series of revolving dashers. By this means a large proportion of the dust was removed, this being afterwards taken out of the water lute manually with long scoops, an irksome operation. From the washer, the gas was conducted into a high lead-lined acid tower, filled with earthenware ring tiles, where in passing upwards it came into contact with sulphate of ammonia solution trickling down. This solution contained a slight excess of sulphuric acid and deprived the gas, by absorption, of nearly all the ammonia contained in it. From this tower, the gas was passed into a similar tower, called the scrubber, where it was brought into contact with cool water for scrubbing and cooling, and was then delivered for use. The water, having taken up the heat of the gas, was collected in tanks from which it was introduced into the heater, also of tower construction. It was here brought into contact with the cold air to be used in the producers, saturating this air with water vapor at from 70 to 80 degrees Cent. and becoming again cooled. Then it was returned to the scrubber, where it again took up the heat of the gas, and so on in a continuous cycle.

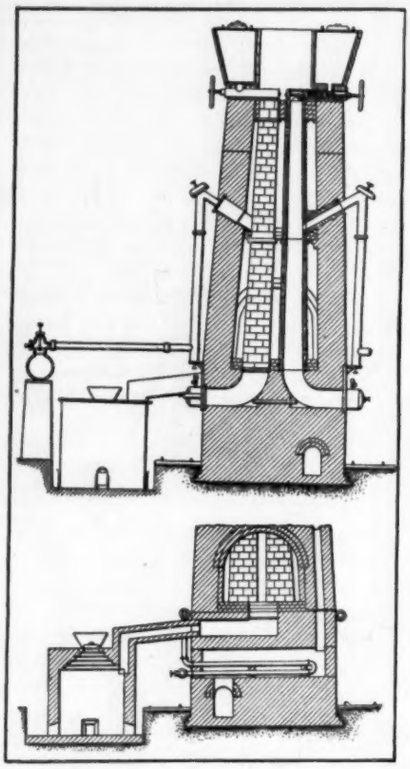


FIG. 2—YOUNG AND BEILBY'S BY-PRODUCT GAS PRODUCER

Superheat Entering Blast

After this plant had been in operation for some time, it was found that, owing to the large proportion of steam in the air blast, the heat value of the gas was below the desired standard and also the yield of am-

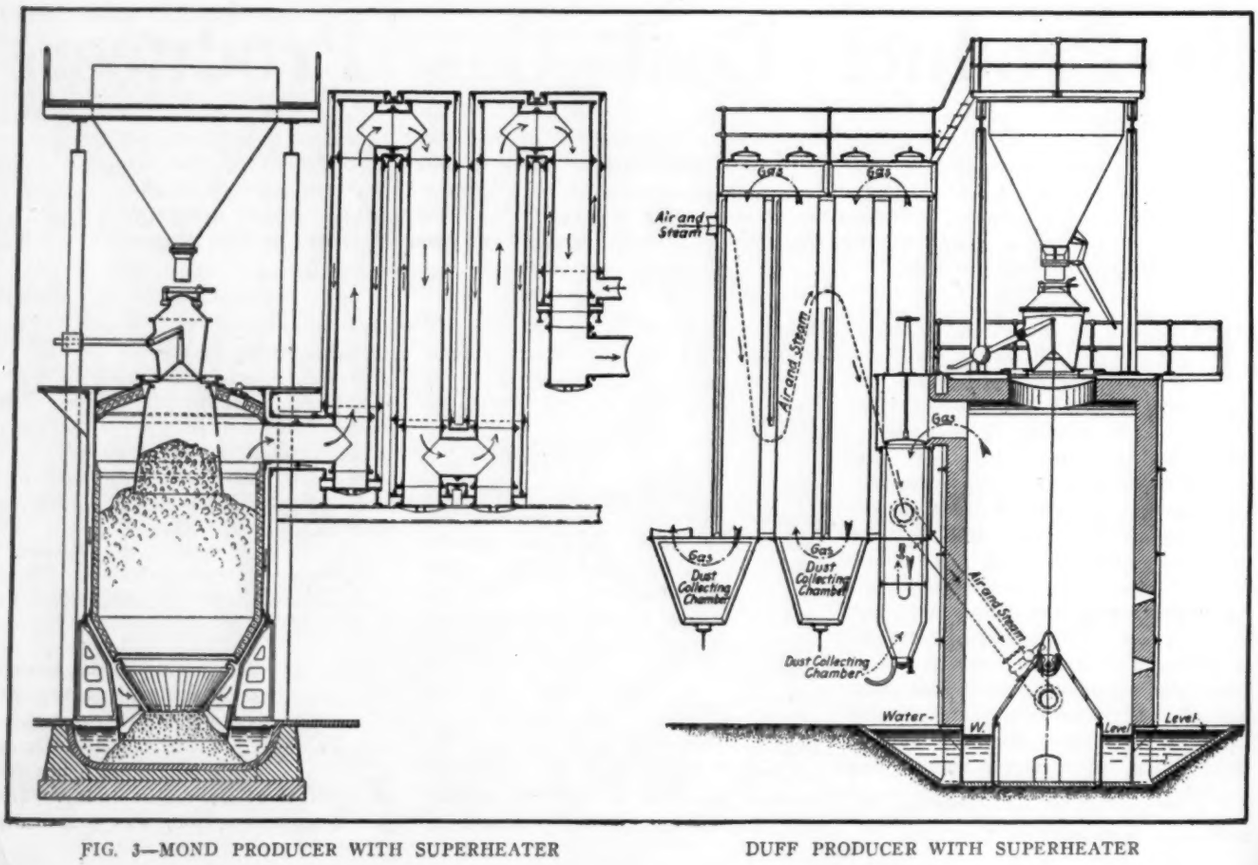


FIG. 3—MOND PRODUCER WITH SUPERHEATER DUFF PRODUCER WITH SUPERHEATER

monia was less than that which Dr. Mond had set out to obtain. It was therefore decided to change the design of the gas generating part of the plant so that the air and steam blast would enter the producer with a considerable degree of superheat, thus enabling a still greater excess of steam to be used. This modified design is shown in Fig. 3. The producer was made circular in section instead of rectangular and its whole shell was surrounded by a jacket through which the air was passed on its way to the grate, reducing the losses from radiation and at the same time further superheating the steam and air blast. Directly contiguous to the producer was arranged a superheater, consisting of a series of parallel tubes with alternate ends connected, surrounded by a series of larger tubes forming an annular space. The gas from the producer passed through the inner tubes and superheated the steam and air blast which was passed through the annular space in a counter-current direction on its way to the producer. With this provision, the gas was found to possess a much higher heat value and a considerably increased yield of ammonia was obtained without extra fuel. It is interesting to note that Dr. Mond, with that great courage in engineering undertakings for which he was famed in the days of his greatest activities, built a very large unit plant at the outset, and smaller plants in later years. This was contrary to the usual order of things, and discloses the reason for the widespread idea that by-product producer plants were only profitable when built in very large and costly units. Among the plants built by Dr. Mond or his successors in England the central station at Dudley Port, Staffordshire, for the distribution of Mond gas over an area of about 120 square miles, through about 30 to 40 miles of pipes, is of particular interest. The author had charge of this plant for some time. The gas from this station is supplied to iron and steel works, machine shops, foundries, galvanizing works, pumping stations, enameling works and municipal electric stations. The installation had originally a capacity of 16,000 horsepower, which has recently been largely increased. The Dudley Port plant is quite unique in that it is the only central station in the world designed and built for the distribution of producer gas. The gas is sold to consumers in competition with coal, ordinary lighting gas and electricity. The advantages to be derived from taking supplies of the gas were not apparent to the public for several years, but once they had been fully demonstrated the number of consumers rapidly increased.

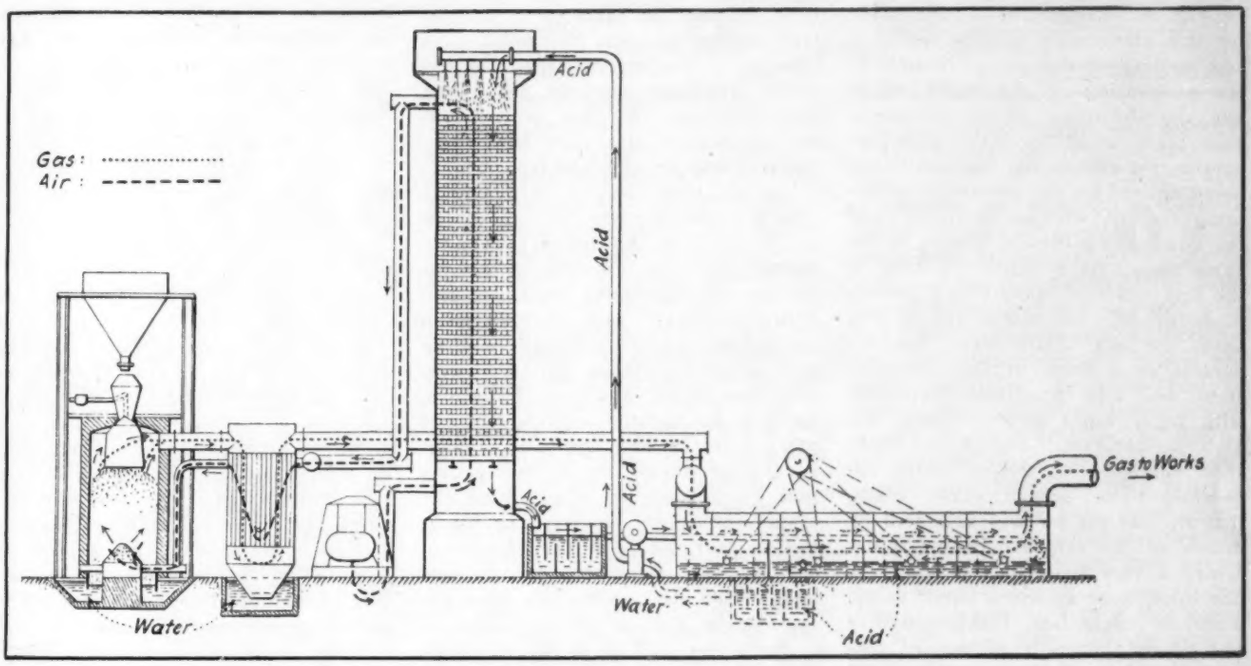


FIG. 4—CROSSLEY AND RIGBY PATENT AMMONIA RECOVERY PLANT

Not Progressive

Up to about the year 1897, Dr. Mond was constantly endeavoring to improve his process, but after that time he appeared to be satisfied with his design. The result was that the design of the Mond plants did not advance with the times and the writer is of the opinion that in those cases in America in which mond system plants have not been so successful as was expected, it has been chiefly attributable to this factor and to the failure to realize that a certain state of reliability and efficiency in other countries, with quite different fuels and under totally unlike conditions, is not necessarily a criterion for exactly the same results in this country. After Dr. Mond had demonstrated the success of his process, it was not long before another worker, E. J. Duff, claimed attention. As a whole, Duff's plant embodied very little to distinguish it from the Mond plant, the same process being, of course, carried out in the two plants. Duff's producer was of rectangular section inside, with rounded corners, and his superheater, as shown in Fig. 3, consisted of a series of parallel gas tubes with alternate ends connected, surrounded by one chamber. Baffle plates in this chamber compelled the steam and air blast to take a zig-zag path on its way to the producer. Except for this slight difference in the construction of the superheater, which, however, occasioned no difference in the action of the producer, there was practically nothing to distinguish the Duff plant from the Mond plant. Several large plants were constructed according to Mr. Duff's designs.

Large towers for ammonia absorption, gas cooling and air saturation are characteristic of the plants of this construction.

Messrs. Crossley Bros., of Manchester, were the next to claim material improvements, which, however, do not appear to have been realized

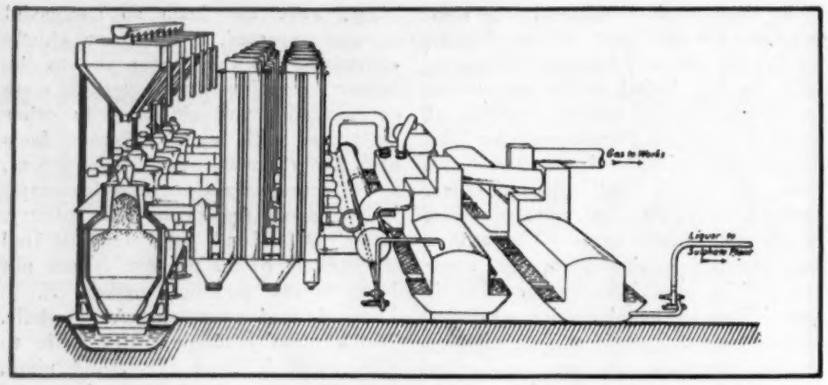


FIG. 5—MOND TYPE AMMONIA RECOVERY PLANT WITH DOUBLE CHAMBER WASHERS

in practice. It is perhaps of interest nevertheless to include here a diagram of the first form of plant Messrs. Crossley Bros. adopted, shown in Fig. 4. Briefly the claims made for this plant were that the washing and cooling of the gases, as well as the condensing of the water vapor and the absorption of the ammonia, took place in one and the same apparatus, the ammonium sulphate liquor being utilized for the purpose of saturating the air with water vapor and the liquid being thereby cooled at the same time. As a matter of fact, in the first series of operations a washer made up of two compartments was used; the gas would leave this apparatus in a more or less uncooled state and also practically saturated with water vapor at a comparatively high temperature. Fig. 4 does not show therefore all the necessary apparatus. The second claim made, that is, that the air was saturated by means of the sulphate liquor, represented a very dangerous practice. A fine sulphate of ammonia liquor spray, with its excess of highly-corrosive acid, would naturally be carried forward to the superheaters, etc., and with very obvious results. Messrs. Crossley Bros., as a matter of fact, took out later a patent for the utilization of the above system in combination with a somewhat costly bed of lime, which the saturated air had to pass through, clearly to absorb its contained acid spray.

Attempt to Eliminate Towers

The next step in the development of this process was that taken by the author. This was an attempt to dispense entirely with the costly and irksome towers of the mond and other plants, which became blocked up from time to time, causing serious trouble and delay. The attempt was made by replacing the mechanical washer and towers by washers of special construction, which obviously could not become blocked up. Four double washers were proposed, one for washing the gas, the second for absorbing the ammonia, the third for cooling the gas and the fourth for saturating the air. This design was later modified in favor of a double-luted washer and was changed a third time for a combination of double and single chamber washers upon the same principle. An idea of the general appearance of a plant with these washers may be obtained from Fig. 5.

Various modifications of ammonia recovery plants were also made by A. B. Duff, of Pittsburgh. Notable among these is a producer with a circular grate and also a circular section superheater with four enclosed gas tubes. These modifications have been adopted in Great Britain in two or three plants and are, I believe, working successfully with Scotch and other more or less non-caking coals. In another design, A. B. Duff claims that by passing the gas around the evaporator before entering the washers, its heat can be utilized for evaporating the sulphate of ammonia liquor. On first sight, this idea appears to be a good one, but it seems to the writer that great difficulty may be experienced in carrying it out in practice on account of the dust and tar present in the gas at this stage of the operations. Moreover, it must be borne in mind that in this design the gas is washed before it is allowed to enter the ammonia absorption tower, and that the washing water is used for saturating the air going into the producers. It therefore appears that the air will carry to the producers a not inconsiderable proportion of the ammonia, which will thus be lost. The author is not aware of a plant on these lines having been built and put into operation.

Employs Condensing Plant

It may be taken that all the designs above referred to were, broadly considered, based upon what is generally known throughout the world as the mond process. Two different propositions for the gasification of coal and the simultaneous recovery of the by-products will now be referred to. The first of these is that by F. J. Rowan, of Glasgow, who proposed to combine the gas producer process with the usual process utilized in lighting gas works, that is, to replace the absorption of the ammonia by acid by a condensing plant. He did not propose actually to produce the ammonia in any different way, and it is obvious that since, for every ton of coal gasified, approximately 150,000 cubic feet of gas at normal temperature and pressure, together with about 1.5 tons of excess water vapor, are produced, an apparatus for condensing the ammonia cannot be otherwise than very excessive in size. Moreover, the gases enter the condensing plant at a temperature of 400 degrees Cent. or more, at which temperature their volume is multiplied several times. The condensed ammonia liquor is extremely dilute and must be distilled with lime in the usual manner adopted in lighting gas works, a not very

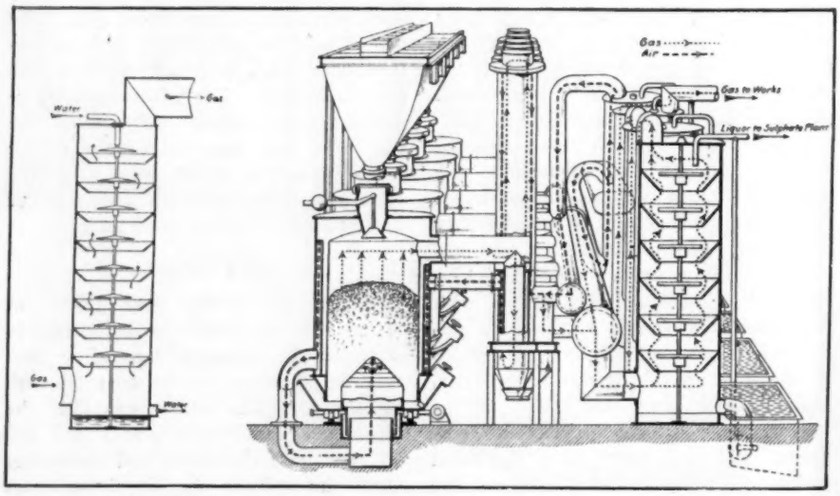


FIG. 6—VERTICAL WASHER. LYMN TYPE PRODUCER GAS AMMONIA RECOVERY PLANT

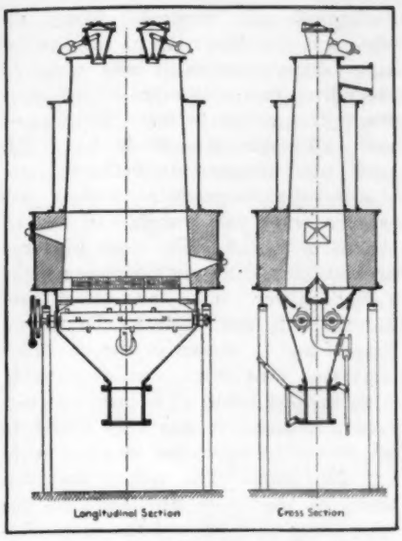


FIG. 7—MOORE'S THREE-PART PRODUCER

pleasant operation. These facts make the difficulty of carrying out this proposition obvious, and the writer is not aware that any plant has been built on these lines. The author himself has tried surface cooling for by-product producer gas but has found firstly, that meteorological conditions have too much influence on the result and secondly, that the apparatus required would be much more expensive owing to the large volume of gas to be dealt with and the lower rate of heat transference possible. The second proposition is that by Quintin Moore, who designed a producer divided into three parts, a lower brick-lined part, a middle water-jacketed part and an upper air-cooled part. The arrangement is shown in Fig. 7. By this cooling of the upper part of the producer, Moore claimed to obtain a good yield of ammonia with about half the amount of steam in the air blast. It does not seem likely, however, that such cooling can penetrate far into the fuel bed, and it should not be overlooked that other workers, in particular the late Dr. Mond, previously considered the possibility of recovering ammonia by means of merely cooling the producer, but came to the conclusion based on sound scientific knowledge, that cooling was not the only desideratum in ammonia recovery. One can easily overrate, too, the importance of saving steam. In the mond process, practically all the steam is generated from waste heat and, moreover, most of it is continuously recovered. Any further saving can only be secured at the expense of some of the sulphate of ammonia yield. At all events, Mr. Moore states in his published matter that he obtains more ammonia when he introduces more steam, hence his usual amount of steam does not produce the maximum ammonia recovery. In the Moore system, the small air-cooled tubes are so constructed and in such a position as to bring about great likelihood of frequent stoppage of the plant on account of tar and dust deposits. Whatever may be the results with this plant with non-caking coals, the plant does not seem to be applicable to caking fuels with any reasonable degree of efficiency. The only publication regarding this system which has come before the writer shows the results of tests of but five hours duration, which have obviously but little value for practical purposes.

Designs New Plant

Some five years ago the writer set out to design a new type of plant which should retain the advantages of previous types without their disadvantages. He was led to do this by the realization that, in spite of the extreme cheapness of producer gas as made by plants operating under the mond system and although a considerable number of plants had been built and operated in a somewhat restricted number of countries, the adoption of the producer gas process had not become general throughout the industrial world. Careful investigations of the situation led to the conclusion that although the process as such was, and is, really good, the means adopted for carrying it out left much to be desired, especially from the point of view of capital outlay, labor requirement, repair costs and simplicity of operation. These drawbacks were inherent primarily to the ammonia absorption, gas washing, gas cooling and air saturating elements of the plant. All these operations were heretofore carried out in high and cumbersome towers packed with earthenware ring tiles, or were performed in equally cumbersome horizontal luted dasher washers.

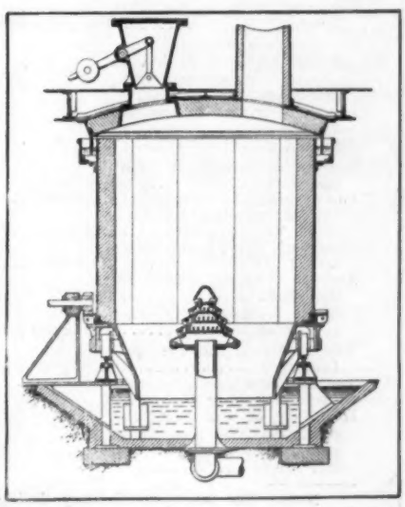


FIG. 8 — DUFF PATENT REVOLVABLE PRODUCER

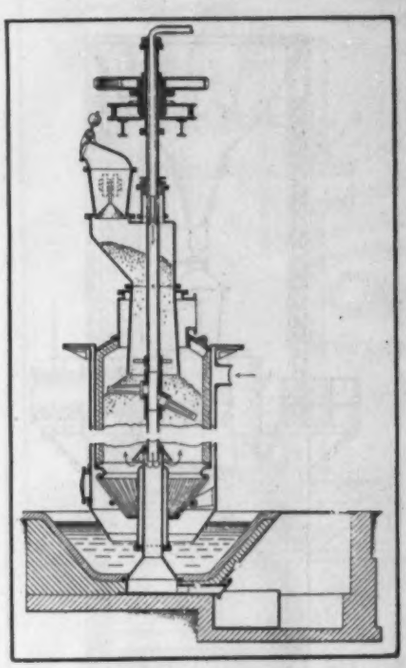


FIG. 9 — MOND PRODUCER COMBINED WITH TALBOT STIRRER

A system of vertical washers, in which an intensive washing of the gases was brought about chiefly by means of the momentum of the gases, was first designed and put into practice. Vertical mechanical washers had not been used previously in gas producer plants and the writer first designed one on the lines already known in other branches of the gas industry, in which the washing liquid was sprayed by means of a series of co-axial revolving discs upon collecting cones, each of which delivered the liquid directly upon the next revolving disc below, and so on. It was found, however, in setting this washer to work, that with such an arrangement, the momentum of the gas was performing much more work than was the mechanical movement of the discs, a rather surprising fact. Accordingly, the mechanical feature of the washer was eliminated, the collecting cones were cut away to give the gas more play and the washer now had the appearance shown in Fig. 6. It will be seen that if plumb lines are taken down the inside edges of the collecting cones and down the outside edges of the discs, a considerable space exists between them, which is such in practice that, if no gas is passing, the water entering at the top falls straight down to the bottom. With this modified washer, a plant originally designed to deal with the gas from 45 to 50 tons of coal per day was able to deal with that from 90 to 100 tons per day, so that the capital outlay of the gas washing part of the plant was straightway reduced one-half. Such

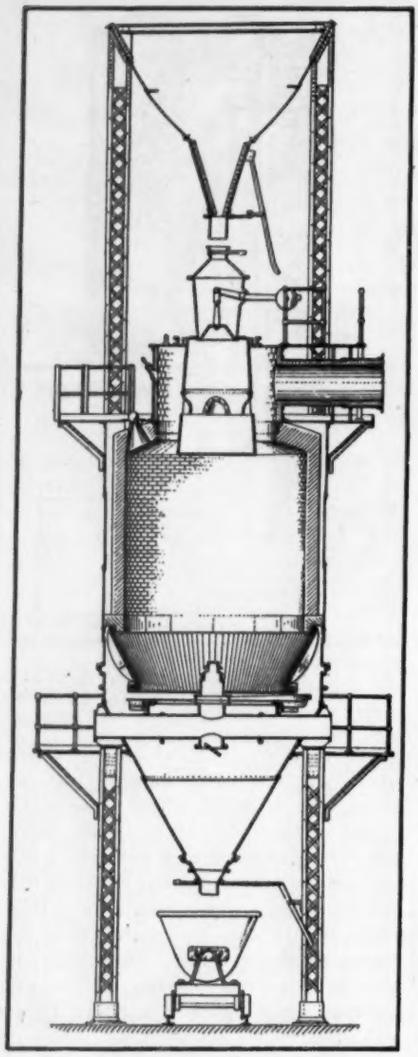


FIG. 10—MOND-TRUMP PRODUCER WITH DRY ASH DISCHARGE

washers have now been in operation for approximately two years with entire success, and it is now possible to design washer units of this particular type to deal with quantities of gas from 10,000 up to about 1,300,000 cubic feet per hour.

Fig. 6 also illustrates the general appearance of a plant with these washers. The dimensioning of the washers is not a very simple matter, being of necessity purely empirical, and the author has arrived at the dimensions entirely by stepwise trial. If Fig. 6 is compared with the previously shown diagrams of other plants, it will be seen that the whole apparatus looks much less cumbersome and obviously simpler in operation, involves less auxiliary machinery and consequently less first cost. It will be further noted that exactly the same kind of apparatus is employed for each of the operations of absorbing the ammonia, cleaning the gas and recovering the steam. For the final stage of removing the last traces of tar, etc., however, centrifugal cleaners combined with dry scrubbers, or such methods as have been proposed by H. F. Smith, have to be utilized. Steel, instead of lead, is used in these plants for the parts of ammonia absorbing apparatus. A plant constructed with no lead whatever has been in operation in Germany for approximately four years and no corrosion has yet been discovered. Its capacity is 8,000 horsepower.

Removal of Dust

Improvements in the removal of dust have been accomplished by the adoption of a cyclonic dust separator of somewhat special design. With this separator, the bulk of the dust is removed in a dry state and not by means of water. The removal of the wet and sloppy dust from the earlier horizontal rectangular washers was a very troublesome proceeding, involving considerable costly manual labor, as will easily be realized. In the gas producer itself of an ammonia recovery plant, mechanical action which has been so widely applied to ordinary gas producers, both in the United States and in Germany but not so much in England, involves agitation in the fuel and ash zones of the producer and mechanical ash removal. Many attempts in this direction of mechanical action have been made and some of them have met with more or less success. The writer believes the first of such proposals was made by E. J. Duff, who designed an octagonal-section revolvable producer with a stationary grate, ash trough and top, as shown in Fig. 8. The next of these proposals was a combination of the Talbot stirrer with the mond producer. This was made by Dr. Mond himself and is shown in Fig. 9. This apparatus was tried out thoroughly with various coals of a more or less coking nature. It was very costly to install and its operation was not without difficulties. The writer does not know of any more producers of this type being built beyond the first. Another attempt to adapt revolving producers to ammonia recovery plants was one made by the author, but it was not sufficiently successful to warrant general adoption. The great depth of fuel requisite for ammonia recovery renders the operation of mechanical producers exceedingly difficult. One of the difficulties found by the writer in practice was that, when using a caking coal, the producer revolved while the coal remained

Table I.

ACTUAL OPERATING RESULTS OF POWER GAS PLANT (LYMN SYSTEM)
Driving Large Gas Engines and Firing Furnaces.

First period of four wks.	Total.	Average per day of 24 hours.	General Average.
Coal consumption of the gas plant	1,806 tons	64.6 tons	Per kw-hr. 1.58 lb. (0.72 kg.)
Power produced (kw-hr.)	1,889,740	.....	Per hr. 2812 kw.
Yield of sulphate of ammonia	49.11 tons	1.76 tons	Per ton coal 60 lb. (27.1 kg.)
Yield of tar (containing water)	189.7 tons	6.78 tons	Per ton coal 230 lb. (105 kg.)
Average heating value of the gases	155 B. T. U. per cu. ft. (1380 cal. per cu. m.)		
Sulphur contained in the gas (average)	0.63 grams per cu. m.		
Tar contained in the gas (average)	0.04 grams per cu. m.		
The auxiliary machines consumed regularly 71 kw... Including 10 per cent depreciation the gas costs per kw-hr. work out at 0.069 cents			
Second period of 4 wks..			
Coal consumption of the gas plant	1,967 tons	70.2 tons	Per kw-hr. 1.72 lb. (0.78 kg.)
Power produced (kw-hr.)	1,899,600	.....	Per hr. 2830 kw.
Yield of sulphate of ammonia	54.3 tons	1.94 tons	Per ton coal 61 lb. (27.6 kg.)
Yield of tar (containing water)	231.7 tons	8.27 tons	Per ton coal 257 lb. (117 kg.)
Average heating value of the gases	154 B. T. U. per cu. ft.		
Sulphur contained in the gas (average)	0.38 grams per cu. m.		
Tar contained in the gas (average)	0.057 grams per cu. m.		
The auxiliary machines consumed regularly 78 kw... Including 10 per cent depreciation the gas costs per kw-hr. work out at 0.07 cents			

Note.—The nitrogen efficiency during these two periods was 70 per cent. It is frequently 75 per cent.

more or less stationary, resulting only in the grinding of the coal at the periphery of the producer. Another step in this direction was the combination with the producer of the mechanical ash removing apparatus designed by Mr. Trump. This combination is illustrated in Fig. 10, and has been adopted on a somewhat large scale. A battery of these so-called Mond-Trump producers was built in England and at the time of its installation the writer was hopeful that the combination, though very costly, would prove to be a valuable development; however, the information to hand regarding it is not very encouraging.

Still another proposition is that made by A. B. Duff, in which a mechanically operated stirring poker is utilized in the producer shown in Fig. 11. This worked very well indeed when tried with Scotch washed nut

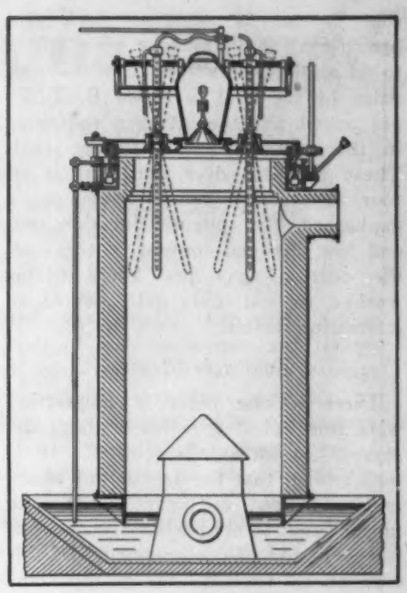


FIG. 11—A. B. DUFF'S PATENT MECHANICAL STIRRER

and the writer believes it has been further adopted for use with this or similar coals. Scotch coal does not cake, however, and therefore with such coal there appears to be insufficient justification for incurring the additional cost of this stirring gear, except it be for the purpose of increasing the rate of gasification.

The design of producer adopted by the author is based on the principle which has been so largely utilized for ordinary hot gas producers in Europe, where the rotary grate and the mechanical ash removal have been further constructionally improved and very widely introduced both by Kerpely of Vienna and by the writer's German licensees. On the basis of the last-named firm's designs as adopted for hot gas producers, the system has been applied to ammonia recovery, material modifications being of course necessary. These modifications are to provide a vastly increased volume of air and steam, a deeper fuel bed, superheating of the blast of air and steam, increased pressure of the air blast and consequently deeper water lute, etc. Plants on this system have been built by the Badische Anilin und Soda-Fabrik, of Ludwigshafen, and by the German government at Heinitz. Several others are under construction. These represent the latest type of this plant adopted in large scale practice. The plants in operation have worked well and a resume of the operating results of one plant is given in Table I. These results are taken from the daily log sheets of a plant now gasifying about 80 tons of coal per 24 hours, the gas being used for driving four 1,300 horsepower gas engine electric sets and also for firing furnaces. The

Table II.

ESTIMATES OF WORKING COSTS FOR (I) A 2,000 H. P. POWER GAS INSTALLATION, (II) A 4,500 KW. PRODUCER GAS PLANT, AND (III) A PRODUCER GAS PLANT FOR CONTINUOUS GASIFICATION OF 500 TONS OF COAL DAILY

Conditions:— Load Conditions of Plant.	I Power.	II Power.	III Heating.
Hours of full load per annum	4,000	8,500	8,760
Size of plant in B. H. P. or Kw. or long tons of coal per day	2,000 B.H.P. (1350 kw.)	6,600 B.H.P. (4500 kw.)	500 tons.
Cost of coal in dollars per short ton	2	1	2
Heating value of coal in B. T. U. per lb	12,600	12,600	12,600
Nitrogen content of coal in per cent	1.3	1.3	1.3
Cost of sulphuric acid (140 deg. Twaddell) in dollars per short ton	9	9	9
Value of sulphate of ammonia in dollars per short ton	55	55	55
Value of tar in dollars per short ton	5	5	5
Heat consumption of gas engines in B. T. U. per kw-hr.	14,900	14,300	.....
Cost of Plant:—			
Producer power gas and ammonia recovery plant (Lymn System) in dollars	40,600	126,500	605,000
Buildings and foundations for same	4,400	12,000	55,000
Complete gas engine installation consisting of gas engines, dynamos, all auxiliary machines, exhaust boilers, overhead crane, etc., in dollars	88,000	335,500	.....
Buildings and foundations in dollars	13,000	48,000†	.....
Total cost of installation	138,000	522,000	660,000
Working Data:—			
Amount of kw-hr. per annum	5,400,000	38,250,000	.....
Tons of coal used (including stand-by losses) per annum	4,830	29,840	204,400
Tons of sulphate of ammonia recovered per annum	206	1,346	9,210
Tons of tar recovered per annum	230	1,500	10,500
Tons of sulphuric acid consumed per annum	190	1,280	8,800
Rate of amortization on machines and plant in per cent per annum	12	12	12
Rate of amortization on buildings and foundations in per cent per annum	6	6	6
Annual Working Costs in Dollars of Producer Gas and Ammonia Recovery Plant (Lymn System):—			
Cost of coal	9,660	29,840	408,800
Labor	5,600	16,630	49,500
Repairs and maintenance	1,230	3,780	18,000
Oil, waste, lighting, etc	680	2,990	15,330
Sulphuric acid	1,710	11,520	79,200
Depreciation and interest	5,132	15,900	75,900
Total debit	24,012	80,560	646,730
Credit by sulphate of ammonia	11,330	74,030	506,550
Credit by tar	1,150	7,500	52,500
Total credit	12,480	81,530	559,050
Total annual cost of gas	11,012	970 Profit	87,680
Cost of gas in cents per 1,000 cu. ft. (heating value 150 B. T. U. per cu. ft. net)	2.10	0.03	0.32
Annual Working Costs of Gas Engine Plant:— (Based upon first class German gas eng. practice)	Dollars per annum.	Dollars per annum.	
Cost of gas as above	11,012	970 Profit	.....
Repairs	1,250	5,170	.....
Oil, waste, water	840	4,420	.....
Labor at American rates	3,590	10,370	.....
Depreciation and interest	10,380	3,180	.....
Total costs	27,072	62,170	.....
Total cost of power in cents per kw-hr	0.50	0.16	.....
Total cost of power in dollars per kw-year	.....	13.80	.....
Total cost of power in dollars per H. P. year	.....	10.30	.....

†(Spare set of 2,250 kw.)

coal in use is common slack and brown-coal at an average price of 12 to 13 shillings per ton. The heating value of the coal is 10,400 B. T. U. per pound, and the nitrogen contained in the coal averages 0.80 per cent. These records cover two periods of four weeks, each being selected quite haphazard. In spite of the high cost and low nitrogen content of the coal, the cost of gas per kilowatt-hour worked out at only 0.13 cents, an interesting result.

Saving in Steam

There is one point in connection with this industry which I think deserves considerable attention. It is well known that the amount of steam generally used in these plants with normal coal is approximately 2½ tons for every ton of coal gasified. Of this amount, up to two-fifths is recovered from the heat of the gases, during the gas cooling and air saturating cycle of operations, in a modern and properly designed plant. The remainder, 1½ tons, has, however, to be made by direct coal-fired boilers or other means. Needless to say the provision of separate boilers involves a considerable charge on the operating costs of the plant, and it should therefore always be one's endeavor to obtain as large a quantity of steam as possible in the form of waste steam at practically atmospheric pressure, which is quite sufficient, or to raise such steam by utilizing waste heat.

In connection with gas power plants, the steam can be made by utilizing the heat of the exhaust gases from the gas engines. This is a problem to which the author has devoted considerable attention, and in the plant referred to above, all the steam is produced in special boilers of his own design which are heated by the exhaust from the gas engines. In this particular installation there are four boilers, each attached to a 1,300-horsepower gas engine, and each raising 2 to 3 pounds of steam per horsepower. This amount of steam is 25 per cent more than that required for the gasification of the coal.

It may be suggested that when boilers are utilized for this purpose there is danger of corrosion, but four years' full-time operation is sufficient criterion that this is not so. The writer's experience is that satisfactory operation is merely a question of properly dimensioning the boilers.

To give a general idea of the adaptability of ammonia recovery plants for power as well as for heating purposes, three estimates of working costs have been made for (I) a 2,000-horsepower power gas installation, coupled together with gas engines and working 4,000 hours per year, (II) a 4,500-kilowatt producer gas plant, coupled together with gas engines and dynamos furnishing current for say electrochemical purposes, working 8,500 hours per year, and erected near a colliery where the coal will be cheap, and (III) a producer gas plant for a daily and continuous gasification of 500 tons of coal, the gas being used say for firing steel furnaces. The estimates are given in Table II. The working costs of these three plants are based upon the actual results in practice referred to above. It has been assumed that the cost of labor is 50 per cent and the cost of apparatus is 25 per cent more than in England and Germany.

Table III.

THE NITROGEN CONTENT OF AMERICAN COALS

State.	Am'nt of coal samples analyzed for Nitrogen content.	Aver. content of Nitrogen in per cent on theoretically dry fuel.	State.	Am'nt of coal samples analyzed for Nitrogen content.	Aver. content of Nitrogen in per cent on theoretically dry fuel.
Alabama	37	1.42	North Dakota	6	1.15
Alaska	45	1.14	Ohio	15	1.30
Arizona	1	1.25	Oklahoma	20	1.63
Arkansas	18	1.41	Oregon	1	1.42
California	4	0.97	Pennsylvania	106	1.28
Colorado	176	1.36	Rhode Island	10	0.19
Georgia	1	1.13	Tennessee	15	1.46
Illinois	67	1.28	Texas	5	1.16
Indiana	23	1.27	Utah	32	1.11
Iowa	15	1.16	Virginia	27	1.29
Kansas	30	1.24	Washington	169	1.58
Kentucky	22	1.42	West Virginia	265	1.37
Maryland	15	1.71	Wyoming	192	1.30
Michigan	2	1.38			
Missouri	40	1.11	Total	1,467	....
Montana	81	1.03			
New Mexico	27	1.29	Average	..	1.325

Power Transmission Problem

It will be realized that for industries such as electrochemical plants requiring a large amount of power, it is quite unnecessary to have recourse to water powers which are almost invariably situated in localities quite unsuitable as manufacturing sites and which therefore require long, costly and unreliable transmission systems subject to the dangers of sleet, wind and electrical failures. Every power user who depends upon an uninterrupted supply of current for the success of his operations would gladly dispense with this transmission, even were its high cost of no importance. In considering the development of ammonia recovery plants, the statements made so far have referred to the treatment of coal, which is obviously the most used combustible. They may also be taken, however, as applying to waste coal containing a high percentage of ash, as well as to other poor grade coals, such as lignite, coke breeze, etc. Coke breeze, as obtained in the manufacture of lighting gas, has now a particularly advantageous application in these plants. It is well known that as a general rule the retorts in gas works are heated by means of good trade coke which has a high selling value, but the coke breeze which is sieved out is practically a waste product. This substance can now be dealt with, producing all the gas for firing the retorts together with about 60 pounds of sulphate of ammonia per ton of breeze. Furthermore, much good coke is thus set free for sale to the public at a high value. A large plant is already operating on these lines in England and is very successful and profitable. There are, however, other combustibles whose use in producer plants is restricted on account of the high percentage of water they contain. Such in particular are peat and wet brown-coal.

The writer, as technical manager of the Power-Gas Corporation, England, was able to apply successfully the mond gas process to the treatment of peat between 1904 and 1907. The drying of peat is a most difficult matter and in view of this fact it is interesting to note that today it is possible to produce regularly power gas and by-products from peat containing up to 60 per cent water. This peat can be obtained by relatively short periods of drying in the atmosphere in practically all countries. Evidences of success in this matter are the facts that a 20-ton plant was erected in Germany some years ago to demonstrate the advantages of this process, and another plant dealing with 100 tons of peat per day and producing sulphate of ammonia and power gas, has been in operation in northern Italy for about three years.

The quantity of ammonium sulphate produced per ton of peat depends upon the nitrogen content and varies

(*Continued on page* 1154*b*)

Development of the Cuyuna Range

ALTHOUGH the Cuyuna range in the early period of its development offered many disappointments, twelve years of mining have proved it more and more to contain great possibilities. The very tardiness of its growth was a benefit in disguise. Many discoveries have recently been made which indicate wealth as yet unknown. Mr. Zapffe gives a description of operations at the principal mines of the district during late years.

By CARL ZAPFFE

TWELVE years have elapsed since the first drilling explorations in the Cuyuna iron ore district of Minnesota. Activities of various kinds have marked every year since then. Although during the last 12 months the number of drills operating has dropped off materially, due to the general depression prevailing in the iron ore business, development work is making good headway. This occasion seems therefore a splendid opportunity for the taking of stock and for ascertaining what a dozen years have done for the Cuyuna and for observing how the regard of mining men for the Cuyuna may have changed and how prejudice may have been overcome.

At the outset the Cuyuna district was only a prophecy, but there were enough indications to attract the already large number of explorers looking for new iron ranges. The rapid development of the Mesabi district for a time overshadowed the results of explorations in this district and thus retarded its progress, and one must admit that compared with the Mesabi, the Cuyuna in its early days offered many disappointments.

The Michigan prospectors of that day generally entertained only long-distance views and opinions — although since that time many have made trips through the geologically viewless territory embraced by the Cuyuna district. Cuyuna prospecting was therefore largely conducted and promoted by a new and different group of individuals.

It appears that nature was once more operating as an evener, for the Cuyuna district developments were held back at a time when other iron ores were flooding the markets As a whole the first Cuyuna ores found were of the poorest kind; but later better ores were encountered. Now it is a pleasure to state that only lately have the best ores come to light and that certain recent rather desultory drilling has produced some astonishingly good results—results which indicate far greater possibilities for the south range of the district than perhaps even the most optimistic have ever dared to claim. And, as has often been stated, the district even now has been merely scratched. Another factor that has always retarded developments is the great length of the district. Nor must one forget the periodic economic disturbances that affect any large non-bessemer district. It is also true that nearly every one of the substantial mining operations showed better ores as the underground work was extended than was anticipated from the drilling. Of course difficulties and disappointments have never been lacking; but these are common to all districts. The newer and better developments have come during periods of less excitement, and though they have called for no more courage and sagacity, they have probably required more method and more resources.

A few years after drilling began, I made an estimate of all the ores developed, and found that the average iron content of all material analyzing 50 per cent or more was just about 53 per cent. Only two properties on the north range of the district had been drilled up to that time, one of these being what is now operated as the Kennedy mine.

The following five years was a period of great activity on the north range, and the average iron analysis was gradually increased to a little over 56 per cent by the finding of deposits with large tonnages of 60 per cent ore. Developments on the south range came to a standstill at this time, and the north range activities were in the latter part of the period.

The third period of development was ushered in by the finding of a mineral deposit of hematite ore almost entirely of bessemer grade. In this deposit some of the analyses for iron ran over 69 per cent and some of the phosphorus analyses around 0.010 per cent.

On the north range, a large tonnage of the ore developed is contaminated by decomposed chert. On two properties washing plants have been installed to remove this material and other deleterious

List of Cuyuna Mines and Operations

Mine Name.	Description, Section, Township, Range.	Operator.	Superintendent.	Operation.
North Range.				
Kennedy	29 and 30, 47-28..	Rogers-Brown Ore Co.	G. A. Anderson	Underground
Meacham	11 and 12, 46-29..			Underground
Thompson	2 and 11, 46-29..			Underground
Armour No. 1	10, 46-29..	Inland Steel Co.	W. E. Wearne	and Pit
Armour No. 2	11, 46-29..			Underground
Croft	1, 46-29..	John A. Savage & Co. (Merrimac Mining Co.)	John A. Savage	Underground
Pennington	10, 46-29..	Tod-Stambaugh Co. (Pennington Mining Co.)	John S. Lutes	Pit
Quinn	10, 46-29..	Mahnomen Mining Co.	C. K. Quinn	Pit
Ironton	11, 46-29..	American Manganese Mfg. Co.	Wm. Pascoe	Underground
Cuyuna-Mille Lacs	3, 46-29..			Underground
Hillcrest	9 46-29..	Hill Mines Co.	Wilbur Van Evera	Pit
Rowe	17 and 18, 46-29..	Pittsburgh Steel Ore Co.	John C. Barr	Pit
Iron Mountain	33, 47-29..	Iron Mountain Mining Co.	N. B. Roscoria	Underground
Cuyuna-Sultana	3, 46-29..	Cuyuna-Sultana Iron Co.	A. W. McGuire	Underground
South Range.				
Adams	30, 46-28..	Cuyler Adams	C. C. Adams	Underground
Wilcox	13. 45-30..	Canadian-Cuyuna Iron Mining Co.	A. A. McKay	Underground
Brainerd-Cuyuna	36, 45-31..	Brainerd-Cuyuna Mining Co.	C. C. Jones	Underground
Barrows Mining Co.	16, 44-31..	Barrows Mining Co.	C. B. Rowley	Underground

A paper read at the September meeting of the Lake Superior Mining Institute, Ironwood, Mich.

substances that readily wash out, and thus a large tonnage of otherwise non-marketable material is made available. The results of recent explorations on the south range are quite in contrast to this. As has always been known, the ores here are never the sandy or so-called wash ores. At the present time, the south range ores are averaging not only higher in iron but lower in silica than ever before. During the last 12 months a very large tonnage of brown ore has been developed on the south range that analyzes over 60 per cent iron and under 8 per cent silica. For example, in one instance in one angle hole the first 35 feet of ore averaged 64.52 per cent iron and 1.43 per cent silica and the next 35 feet 60.68 per cent iron and 6.18 per cent silica. Thus 70 feet of ore averaged 62.60 per cent iron and 3.80 per cent silica. In several other very recent cases, surprisingly large quantities of ore averaging over 60 per cent iron and from 3 to 5 per cent silica have been found on the south range. Anyone familiar with all the facts cannot be other than enthusiastic over these recent developments and it is not wild to predict that the south range ores will soon at least equal those of the north range in iron content and may be expected to excel them in furnace value because less apt to contain manganese and too much silica.

Concentrating Ores

The north range deposits, as already mentioned, are frequently much contaminated by disintegrated white chert. This occurs sometimes in minute bands, sometimes in bands a few inches wide, and sometimes as banded masses in which the bands of ore are so thin as to be scarcely visible. In some cases this material has not been removed, and as a result the ores shipped have been undesirably high in silica. Much of this chert is so thoroughly disintegrated that it resembles a white flour when accumulated and will flow like quicksand. From much of the ore-bearing formation this cherty material can be removed by washing and two small and simple washing plants have already been erected for this purpose. Washing such an ore carrying as low as 45 per cent iron dried has raised it to 53 per cent and over. These plants have barely begun to operate, yet they have already produced favorable results and hence promise well for the so-called Cuyuna concentrating ores. As already stated, such ores are unknown on the south range.

With a very few exceptions, north range ore deposits are accompanied by more or less manganiferous material. In most of the ore deposits there is a very substantial tonnage of it, usually so localized that it can be left in the mine or handled without contaminating the regular iron ore product. In a few of the properties, however, apparently nothing other than manganiferous formations exist. Some of these are being operated and small amounts have been shipped. In one case the ores have been graded underground into classes depending mainly upon the manganese content; here the combined metallic units of manganese and iron usually amount to 55 per cent or over. In another instance plans are under way to attempt mechanical grading magnetically at the surface.

Some analyses for manganese have exceeded 50 per cent, but thus far very little material has been shipped that has averaged above 30 per cent, and in the long run it would probably be detrimental to a property to attempt to maintain even only a 25 per cent grade. There is an almost unlimited quantity of manganiferous material ranging from 10 to 15 per cent.

Manganiferous material is unknown on the south range. Rarely is even a 1 per cent analysis encountered, and many deposits will average under one-half of 1 per cent.

Much alarm has been spread in the past over excessive moisture. It is true that at their opening some of the properties yielded ores with 13 and 14 per cent of moisture, but in most cases the percentage is now from 9 to 11.

Calcium manganese and sulphur are negligible. Alumina invariably runs less than 3 per cent. On the south range, alumina averages less than 2 per cent, there being less interbedded slate here than on the north range.

Furnace men have repeatedly spoken very highly of the physical character of the ore. The ores as a whole are granular and slightly lumpy, but sometimes platy or even fine and powdery.

North range ores are prevailingly hematitic and red in color and south range ores prevailing limonitic and brown. Magnetite occurs sparingly and then only as an admixture in small grains and crystals.

North range ore bodies as compared with those of the south range are wide and usually quite irregular in shape, due to the greater amount of minor folding, whereas the south range deposits are longer and narrower and show little or no minor folding. But in both cases the general structural attitude is that of steeply dipping lenses encased in barren rock of various types. Igneous dikes breaking into the beds are thus far an unusual feature and may be regarded as being absent.

Surface waters encountered in shaft sinking have not been as abundant nor as treacherous as originally anticipated, and now that shafts of a variety of types have been successfully sunk, all fears on that score should be dispelled.

Kennedy

This is the pioneer mine in the district. The first shipments were made in 1911, and the total shipments to date amount to nearly 1,000,000 tons. Mining was originally conducted on four closely parallel lenses of ore, but now the ore is taken largely from but two. The shaft is of the wooden drop type with the main level at 262 feet. The surface averages about 125 feet in depth. There is also one timber shaft. The mine has never been worked to capacity, but could easily deliver 400,000 tons or more per year. The ore is medium to coarsely granular, partly brown and partly reddish in color and as mined runs about 55½ per cent. Parts of some of the lenses of ore contain much disintegrated chert which could be washed out and this is now being considered.

Meecham

A circular concrete shaft was dropped through 60 feet of surface and continued to 235 feet, but the operation was discontinued just as the crosscut was started toward the ore body to the south. This deposit is 1,800 feet long, very narrow for a north range deposit, but parts of it are deep. The ore averages between 58 and 59 per cent iron, and parts of it are low in phosphorus.

Thompson

This property embraces three 40-acre tracts running north and south, which contain two separate and parallel deposits. At first a circular concrete shaft was sunk through about 65 feet of surface between the two deposits and a little ore was mined from each and shipped in 1913. The south deposit was subsequently converted into a pit operation. The north deposit is not now being worked. The ore is brownish red and moderately coarse. The pit is one-quarter of a mile long and exposes a maximum width of formation of about 200 feet. Much of the upper part of this deposit is very siliceous and cherty, but as this material is mostly disintegrated, the ore is being beneficiated successfully by a washing process. One small part of the deposit is slightly manganiferous. Shipments are now being made from both the pit and the washer. The average iron content of all the shipments is about 55 per cent.

Armour No. 1

A circular concrete shaft was sunk through 65 feet of surface. The main level is at 300 feet and the main sublevel at 200 feet. This property has been idle since the shipment of ore from

it in the summer of 1913, but this year the westerly part has been stripped and a small quantity of ore is to be shipped from the pit. The ore is moderately granular and red in color with a brownish tone. The ores shipped averaged about 58 per cent iron. A portion of the deposit has slightly manganiferous material associated with it.

Armour No. 2

A circular concrete shaft was sunk through about 53 feet of surface. The main level is at 160 feet. This property contains a very large tonnage of commercial ore of 60 per cent grade, a part of which could perhaps even be mined as bessemer. Although incompletely explored, this deposit apparently contains all the varieties of formations and ores known for the district. The ores shipped have been red with a purple cast and a semi-metallic lustre. They are mostly fine, mixed with some lump, and in grade represent the best ores ever shipped from the district.

Croft

A large circular concrete shaft has been recently ledged, having penetrated 105 feet of surface. Sinking is still in progress. The plan is to crosscut southwardly to the ore deposit at a depth of 200 feet. This is the only bessemer deposit in the entire district. It contains ore very high in iron, some analyses being over 69 per cent. It is of purple cast with a metallic lustre. The deposit is narrow, one-half mile long and has great possibilities with depth. At one place 60 per cent ore is known to a depth of 380 feet.

Pennington

This was the first property to be stripped, and the work shattered numerous predictions and established records for stripping. In less than a year's time about 1,000,000 yards were moved and 100,000 tons of ore shipped. The pit is about 1,000 feet long and exposes a maximum width of rock formations of about 400 feet. All during last year and up to Aug. 1 of this year, this mine lay idle, but before the 1915 season closes about 100,000 tons are to be shipped. The ore deposit is a direct continuation of the deposit in the Armour No. 1 and the ores are identical.

Quinn (Mahnomen Mining Co.)

This property is now being stripped for pit operation. The surface averages about 65 feet in depth. The pit will be about 1,400 feet long and will expose a maximum width of ore of 200 feet. This deposit is not connected with any other adjacent one. It is located along the southern border of an area that contains an immense tonnage of manganiferous material and a very large tonnage of this material is contained on the south side, or hanging wall of the Quinn. The commercial ores are reddish in color and will probably average 57 to 58 per cent when shipped. This mine has great possibilities of ores at depths in excess of 600 feet.

Ironton

This mine was opened by a wooden-lath shaft. The surface is about 65 feet deep. The deposit is a continuation of the Armour No. 2 deposit and the ores are identical in every respect. About 50,000 tons were shipped last year, but the mine is idle this year.

Cuyuna-Mille Lacs

This was opened by a lath shaft in a surface of about 50 feet. The property contains practically only manganiferous material. The operator lists his ore in four grades based on manganese content: (a) 20 per cent dried and over, (b) 15 to 20 per cent, (c) 10 to 15 per cent, (d) 10 per cent and under. The iron ranges from 37 to 40 per cent dried, phosphorus 0.071 to 0.108 per cent, silica 9 to 21 per cent, moisture 10 to 11¼ per cent. The structure of the ore is good, but the economic conditions governing the use of these ores and the present annual consumption presage a limited output of such material. About 50,000 tons have been shipped up to this year. The mine resumed operations about Aug. 1 and 50,000 tons are expected to go forward.

Hillcrest

Stripping by hydraulic methods was started last spring and is still in progress. The surface is about 65 to 70 feet deep. The pit will be about 1,200 feet long and expose a maximum width of ore of about 400 feet. The ore body is co-extensive eastwardly with a very large explored but undeveloped tonnage which can also be wrought by pit-mining methods. The Hillcrest ore averages about 57 per cent iron, and as the deposit is compact, operations should prove profitable.

Rowe

This is the largest pit in operation in the district. The maximum length of iron formation exposed is about 1,200 feet and the maximum width exposed nearly 400 feet. Most of the overburden was removed by hydraulic methods and the remainder by steam shovel. The tonnage of iron formation material that will be handled runs into enormous figures, but much of it must be beneficiated to make a usable ore of it because it contains much disintegrated quartz. This, however, will wash out, and a well-equipped but simple concentrating plant of small proportions has been built. The better ores have a good physical structure, are brown and red in color and are inclined to be siliceous. About 80,000 tons were shipped last year.

Iron Mountain

This property was opened with a lath shaft, the surface being about 60 feet deep. The shaft was sunk to moderate depth and some drifting has been done. The shaft is located on the ore deposit, which is mainly of manganiferous material. About 500 tons were shipped last fall and it is generally understood that a larger quantity will be shipped this season. This mine promises to produce only manganiferous ores.

Cuyuna-Sultana

This property is still in the prospect class and is another of those whose principal problem is making usable a manganiferous iron-bearing formation. Two small lath exploration shafts were sunk through about 50 feet of surface. One of these is now rigged with a simple headframe and equipped with light machinery to raise enough material for tests and investigations of the ore. The parties interested in the property have for some time been attempting to perfect an electrical method for concentrating and mechanical grading. The surface is shallow and the deposit large enough to warrant stripping, but whether the occurrence of the material is such that a shovel operation is preferable remains to be determined.

Adams

A circular concrete shaft was sunk through 123 feet of surface, a 200-foot crosscut driven at a depth of about 200 feet and a drift cut through the ore deposit for about 500 feet. At this depth the underground work developed a width of ore of 150 feet. The ore is granular and somewhat platy and dark in color. The iron content was found to be considerably higher than had been indicated by the earlier drilling. Much of the known ore will average over 58 per cent. About 5,000 tons were stockpiled while development was in progress. The mine was shut down last fall and has been idle ever since. Resumption is contemplated this fall.

Wilcox

A timber drop shaft was ledged at 93 feet and extended to a depth of 160 feet, a crosscut driven for 80 feet, a main level and a sub-level driven and a cargo of ore shipped, all in the short time of one year. About 50,000 tons are expected to go forward this year. The first 10,000 tons averaged 59 per cent in iron

(*Continued on Page* 1154b)

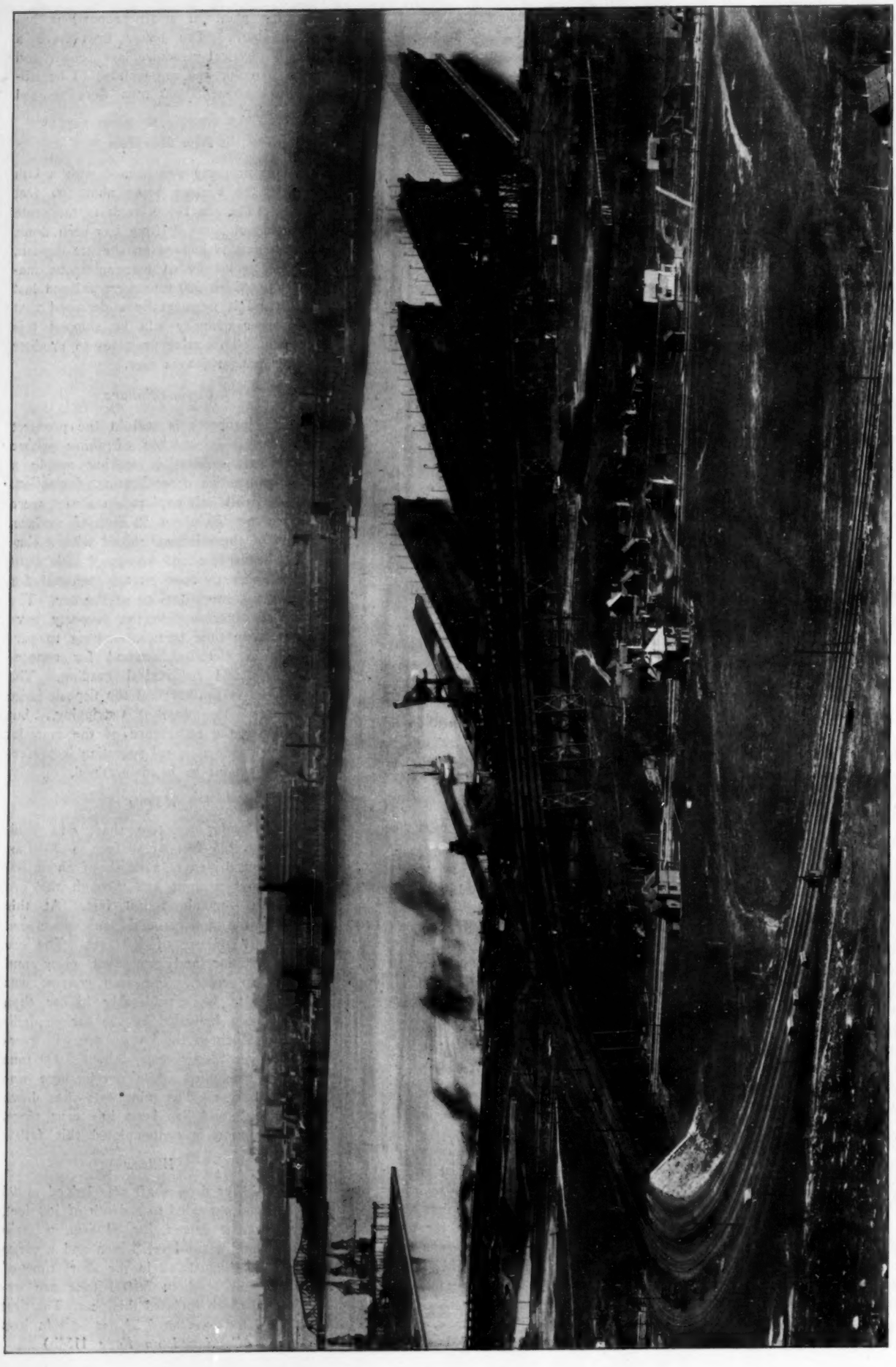


FIG. 1—GENERAL VIEW OF DULUTH, MISSABE & NORTHERN RAILWAY DOCKS AT DULUTH

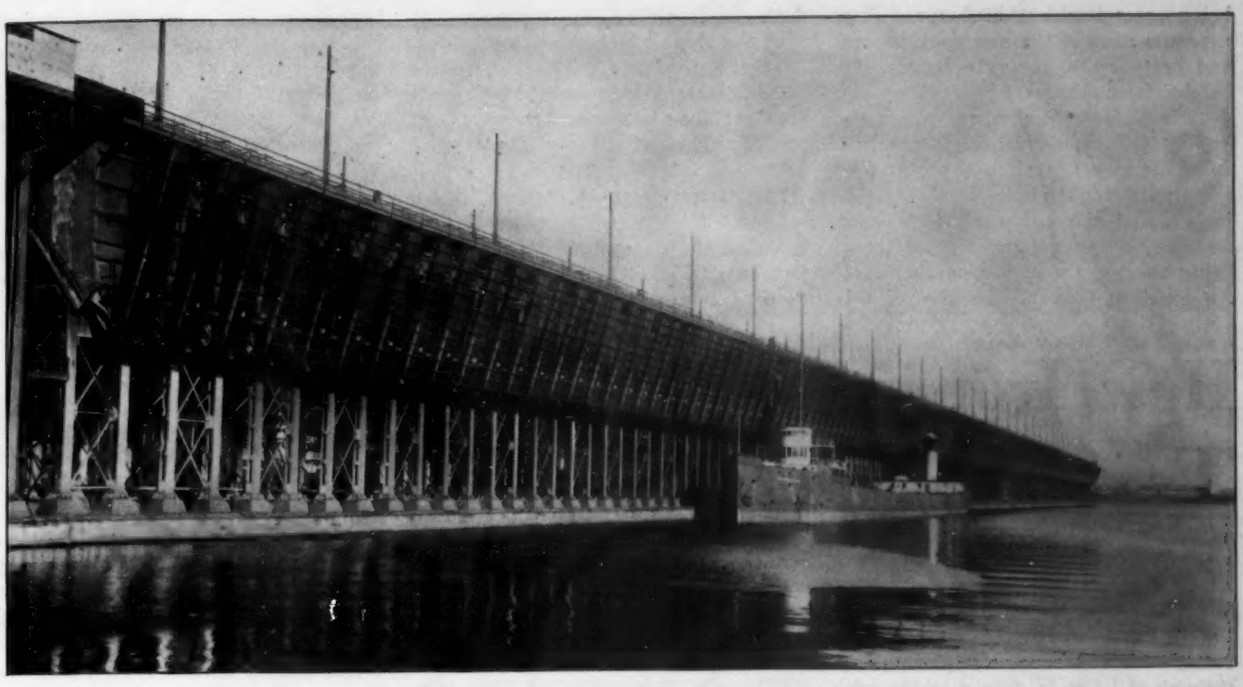


Fig. 2—Bulk freighter Sir William Fairbairn alongside of new Duluth, Missabe & Northern dock

Big Duluth Iron Ore Docks Set Record

THE EQUIPMENT used by the Duluth, Missabe & Northern Railway Co. in handling immense tonnages of iron ore at Duluth, Minn., during the short season of navigation on the Great Lakes, is clearly shown in the accompanying illustrations. In Fig. 1 the four ore docks are shown at the right, the one at the extreme edge of the illustration being dock No. 5, which is said to be the largest loading dock in the world. Adjoining the iron ore docks are smaller docks for handling limestone and lumber. The dock shown at the extreme left is the railway company's coal unloading dock. The new iron ore dock, No. 5, is illustrated in greater detail in Figs. 2 and 3. The first pile for this dock was driven Feb. 8, 1913, and the completed dock began operations April 20, 1915. The dock is 2,304 feet long and has 384 pockets with a storage capacity of 134,400 tons. This ore-holding capacity is the largest of any dock on the lakes, No. 1 dock of the Allouez Bay Dock Co.

FIG. 3—BULK FREIGHTER JAMES A. FARRELL, ONE OF THE LARGEST BOATS ON THE LAKES, BEING LOADED AT NEW DOCK

being second with 112,200 tons. The superstructure of the new dock is steel and rests on a concrete base. The height from the water level to the deck is 80 feet 5 inches, making it the highest dock on the lakes. The height from the water level to the center of the spout hinge hole is 40 feet 9 inches, and the extreme width is 56 feet. The spouts are 36 feet long, being the longest in use on the lakes. An excellent idea of the size of this dock is furnished by comparing it with the ships which are being loaded. In Fig. 2 is shown the bulk freighter SIR WILLIAM FAIRBAIRN. This boat is 425 feet long, 46 feet beam and 28 feet deep, with a gross tonnage of 4,219.

The steamer JAMES A. FARRELL, shown in Fig. 3, is one of the largest boats on the Great Lakes. She is 580 feet long, 58 feet beam and 32 feet deep. Her gross tonnage is 7,705. The boat shown in the foreground at dock No. 4 is the barge GEORGE H. CORLISS, and is typical of this class of lake carrier. She is 352 feet long, 44 feet beam and 26 feet deep, having a gross register of 3,259 tons.

Many records have been established this year by the Missabe docks, the latest mark being set on Saturday, Sept. 4, when 25 boats were loaded with 207,117 gross tons of ore from docks Nos. 3, 4 and 5 during the day.

How Iron is Smelted in Darkest Africa

THE methods of smelting iron practiced by the primitive natives of southwestern Africa do not differ elementally from the Catalan forge process of the ancient Iberians which still survives in the ruder mountain districts of the Spanish peninsula. F. M. Rapp, a traveler who has recently returned from an exploring trip through the Lunda district of Angola, Portugese West Africa, where his party discovered several hitherto unknown rivers, describes methods of iron extraction in vogue among the natives of that region. It is possible that this practice may have been developed, directly or indirectly, from a knowlede of methods of refining which are used by the white man.

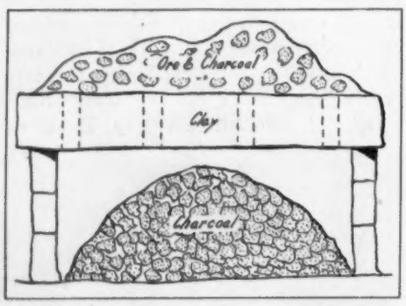


FIG. 1—FIRST SMELTING OPERATION

The ore used is limonite, high in silica and which is very plentiful in the Lunda country. The first process is the baking of a large clay plate of considerable thickness and perforated over its entire area. This plate is propped up several inches above the "hearth" and on it is heaped a mixture of ore and charcoal. The latter is also fed into the space beneath the plate. From eight to a dozen or more natives squat about the rude furnace, each manipulating a small, crude, double bellows of wood and skin. As the charge breaks down, the iron and slag pour through the holes in the plate. When the process is judged complete the disc is removed and the resultant mass of iron and sludge is preserved for future refining work. In the meantime, a large clay crucible, about 4 feet in height and about 16 inches in diameter at the top, with 2½-inch walls and 4-inch bottom, has been molded and baked. Around this crucible, which is firmly supported at the sides and bottom to allow of considerable fire space, is built a large clay mound. In the crucible is placed the spongy mass derived from the earlier smelting operation, together with additional charcoal. Fuel is fed to the fire around the crucible through an 18-inch aperture at the top of the mound, as shown in Fig. 2. The bellows brigade is again mobilized, the natives forcing a draft through the apertures at the bottom of the mound, generally four openings being used. When the charge is sufficiently refined, or when the operator's muscles become weary, the fire is allowed to cool. Later the mound is demolished, the crucible shattered and the ingot taken to a neighboring smithy, where it is subjected to a lengthy forging process. The tools and weapons produced by the Lunda aborigines are declared to be of remarkably good quality and to possess excellent temper.

Book Reviews

Brief Course in Metallurgical Analysis, by Henry Ziegel; published by the Chemical Publishing Co., Easton, Pa., and furnished by *The Iron Trade Review* for $1.

This book is written for the use of upper classmen who have been trained in elementary qualitative and quantitative analysis. It is recommended that students using this book should have had a series of problems in chemical arithmetic. The author states that his object is not to describe all the methods for determining the composition of metallurgical products, rocks and ores, but to describe a series of standard analyses in daily use in various analytical laboratories. The procedures have been chosen so as to avoid the same determinations as far as possible.

Cost Accounting, Theory and Practice; by J. Lee Nicholson; 341 pages; published by Ronald Press Co., 20 Veasey street, New York, and furnished by *The Iron Trade Review* for $4 net.

This volume is one of the Ronald accounting series. The purpose of the author is stated as threefold: To provide a reference book dealing with the practical phases of cost accounting; to present principles and methods so that the student may grasp them quickly; to furnish the manufacturer a work containing all the important practical points summarized and briefly explained. No effort is made to deal with factory or-

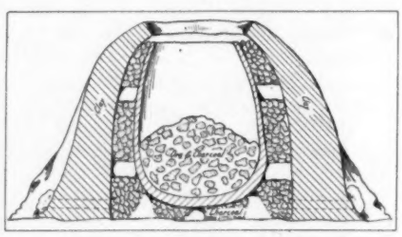


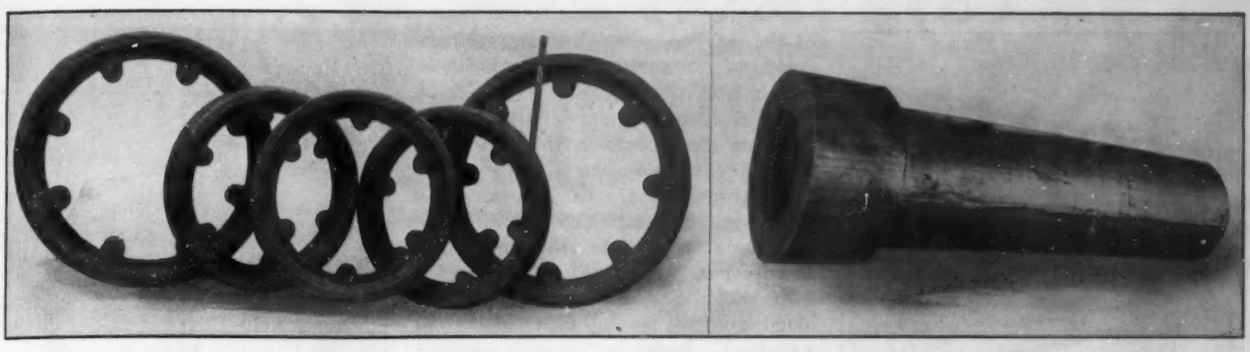
FIG. 2—REDUCING IRON IN CRUCIBLE

ganization and efficiency methods or to present all that might be said on the subject of costs.

The initial chapter is devoted to the functions of cost finding and the second to the elements of costs. Succeeding chapters deal with details of costs, methods of gathering and tabulating data, and forms which may be adapted to the use of any manufacturing plant. Ninety pages are devoted to the latter feature, which is most valuable and supplements the body of the text admirably.

An index of forms and a general index complete the work and render easily available the material in the preceding pages.

The Columbia Castings Co., Detroit, has increased its capital stock from $30,000 to $100,000.



Titanium-Aluminum Bronze Elevator Gear Wheels

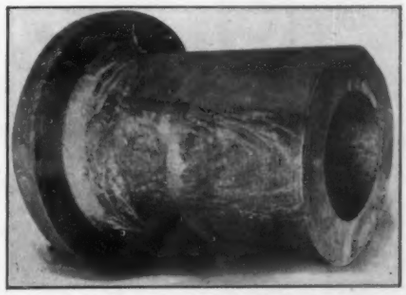
Titanium-Aluminum Bronze Stripper, Weight 1,200 Pounds

Uses of Aluminum Bronze Alloys

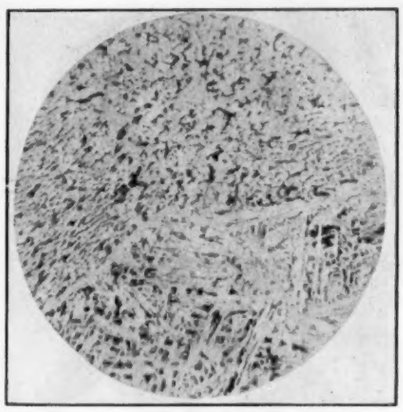
MR. CORSE'S description of the many excellent qualities of these alloys indicates that they will rapidly take their place in the metallurgical world now that certain difficulties in casting have been successfully surmounted. These metals are distinguished for strength, good bearing qualities, resistance to fatigue, absence of liquation, and relatively low specific gravities. The effect of heat treatment on their properties is described.

By W. M. Corse

IN MY experience with nonferrous alloys, I have never worked with a series of metals which were more interesting than the copper-aluminum combination. This refers particularly to the binary alloys of copper with aluminum, with not to exceed 15 per cent of the latter metal. The main properties of these alloys have been described in considerable detail in the eighth report which was made to the alloys research committee of the Institution of Mechanical Engineers of Great Britain.



TITANIUM-ALUMINUM BRONZE NUT



ALLOY NO. 5 HEAT TREATED BY SPECIAL PROCESS — MAGNIFIED 200 DIAMETERS

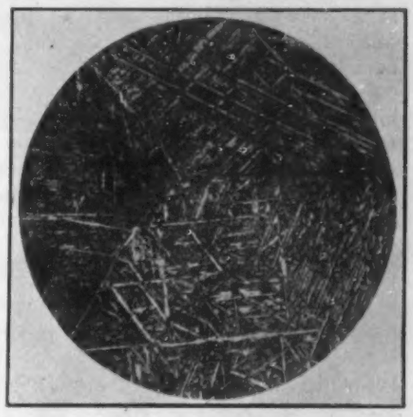
One property that is not brought out as clearly as possible, is the hardness of these alloys. Below 7 per cent of aluminum, heat treatment does not have much, if any, effect, but above that point the hardness can be varied almost at will by different heat treatments and by the addition of other elements such as iron and silicon. The heat treatment of these alloys is carefully described in the report mentioned above, but very little reference is made to any properties affected by the heat treatment except the usual ones of ultimate tensile strength, elastic limit or yield point, elongation and reduction of area.

It has been found that the hardness is very much affected as well as the properties mentioned. This change in hardness develops new uses for the alloys which might not be noticed unless this property is determined on the differently treated samples. This fact is of interest to engineers and other users of bronze castings, all of whom have been trained to think of bronze and brass as relatively soft materials. A hardness of over 100 Brinell is not easy to obtain unless the metal becomes brittle and therefore not always practical for the particular use in mind. Frequently, therefore, steel is used when a bronze would be preferred either for its non-corrosive or its antifrictional properties, if a hard material is wanted.

Aluminum bronze alloys of approximately 10 per cent aluminum, however, possess properties very similar to a Swedish bessemer steel of 0.35 per cent carbon, including the property of being hardened by heat treatment. For instance, heating this alloy to different temperatures up to 800 degrees Cent. will give, on quenching, hardness numbers varying from 100 Brinell to 260 Brinell. This varies somewhat with the area of the cross section of the piece. Many uses immediately suggest themselves for bronzes with hardness above that of 100 Brinell, particularly, as happens in this case, if the bronze possesses good bearing qualities. Bearings, heat-treated in a manner similar to that de-

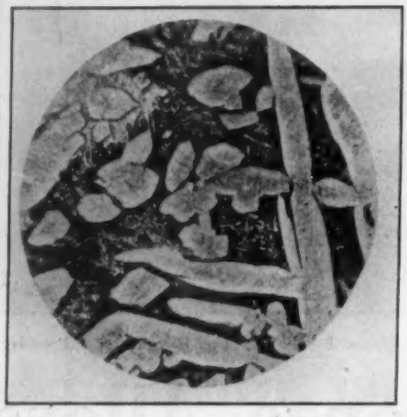
TESTS OF TITANIUM-ALUMINUM BRONZE ALLOY NO. 2

Original cast alloy:—	
Elastic limit, lb. per sq. ft.	19,800
Tensile stg., lb. per sq. in.	74,000
Elong. in 2 in., per cent...	19.5
Reduc. of area, per cent...	23.7
Hardness, Brinell No.....	100
Quench alloy:—	
Elastic limit, lb. per sq. in	40,500
Tens. stgth., lb. per sq. in.	105,200
Elong. in 2 in., per cent...	1.0
Reduc. of area, per cent..	0.8
Hardness, Brinell No.....	262
Special heat-treatment:—	
Elastic limit, lb. per sq. in.	56,700 to 39,300
Tens. stgth., lb. per sq. in.	96,700 to 91,200
Elong. in 2 in., per cent..	5.5 to 14.0
Reduction of area, per cent	9.1 to 18.5
Hardness, Brinell No.....	158 to 140



ALLOY NO. 5 QUENCHED IN WATER FROM 900 DEG. CENT. — MAGNIFIED 200 DIAMETERS

Presented at the Atlantic City meeting of the American Institute of Metals. The author, W. M. Corse, is affiliated with the Titanium Alloy Mfg. Co., Niagara Falls, N. Y.



ALLOY NO. 1 SAND CAST—MAGNIFIED 200 DIAMETERS

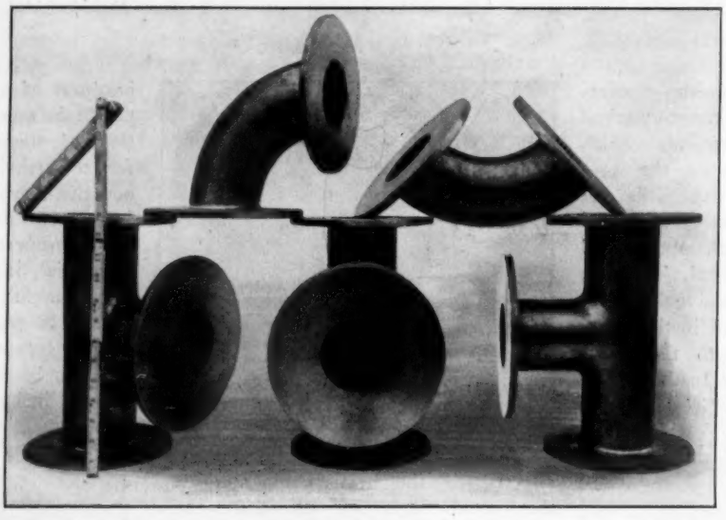
scribed, have been put into machinery running 20,000 revolutions per minute and have given excellent results. Softer bronzes were failures in such places because they would not hold their shape under the severe conditions named. Many places can be thought of where a bearing has to stand high compression, as in a bridge. For such conditions a hard bronze is essential. As stated above, it opens a new field for a metal of the properties mentioned and one which is not adequately filled at present by alloys other than the aluminum bronzes. The accompanying table gives the results of a titanium aluminum bronze, containing 10 per cent aluminum, before and after heat treatment. The apparently low elastic limit or yield point of the original cast alloy is sometimes noted in comparison with manganese bronze, but in explanation it should be stated that the aluminum bronzes show the same elastic limit under tension tests as with alternating stress tests. Manganese bronze and other strong alloys show much lower elastic limit under alternating stress tests than under tension tests.

Another valuable property of the aluminum bronzes is their ability to withstand alternating stresses without showing fatigue. The samples tested by Carpenter and Edwards and discussed in the eighth report to the alloys research committee of the Institution of Mechanical Engineers, constituted a record in this respect.

Comparing aluminum bronze with manganese bronze of the same strength, it was found that the aluminum bronze resisted stresses above its elastic limit for an average of 15 million reversals in a White-Souther machine, while manganese bronze broke at less than one million. In the Landgraf-Turner endurance testing machine the aluminum bronzes resisted 4,500 blows before fracture, while the manganese bronze resisted about 500. From an engineering standpoint this is very important because the test of the fatigue of a metal is really the nearest to the service test that can be made with present facilities.

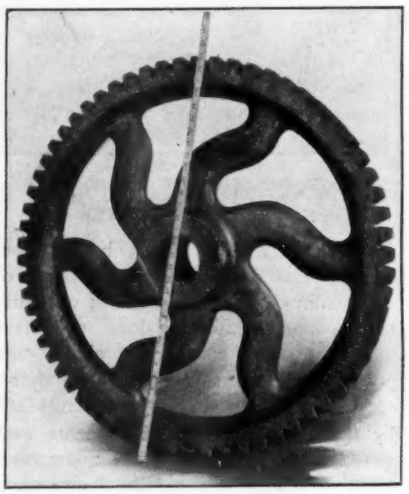
I am glad to be able to report progress in the successful casting of aluminum bronzes, for castings made from bronzes with such valuable properties of strength, good bearing qualities, resistance to fatigue, absence of liquation, and relatively low specific gravity should be available for many engineering specifications. In the foundry with which the writer is associated pieces have been cast weighing 1,200 pounds each and many of difficult design weighing 300 pounds to 400 pounds each. This confirms the statements in the report to the alloys research committee, that by care the usual difficulties of casting the alloy were successfully overcome.

TITANIUM-ALUMINUM BRONZE AUTOMOBILE STEERING SPIDER



TITANIUM-ALUMINUM BRONZE ACID-RESISTING FLANGE FITTINGS

TITANIUM-ALUMINUM BRONZE AEROPLANE MOTOR TUNING GEAR



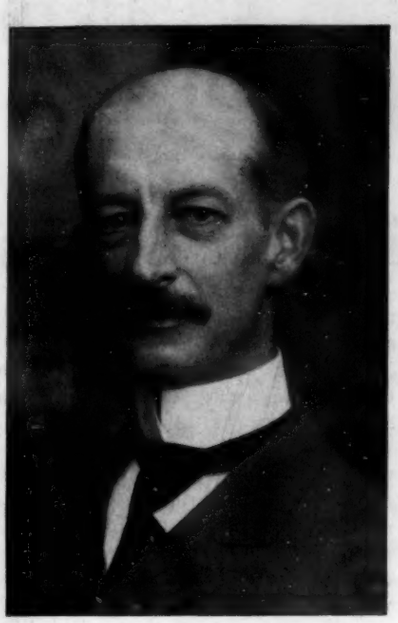
TITANIUM-ALUMINUM BRONZE LOCOMOTIVE GEAR

Steel knives are extensively manufactured in Spain, and one of the manufacturers, whose principal office is in Seville, is seeking supplies of steel for their manufacture on account of a shortage of raw material. He uses annually about 100 tons of steel, and has no objection to paying cash against documents for materials purchased. He desires to import through Seville or Valencia. His factory is in Alicante province. American consular officers believe that the United States will be depended upon to supply the steel needed in Spain during the present war.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

David Schenck Jacobus, new president of the American Society of Mechanical Engineers, long has been an active worker in the affairs of that body. He originally became a member in 1889, served as manager from 1900 to 1903 and as vice president from 1903 to 1905. Dr. Jacobus was born in Ridgefield, N. J., in 1862 and received his education at the Stevens Institute of Technology, Hoboken, N.



DAVID SCHENCK JACOBUS,
New President American Society Mechanical Engineers

J., from which he graduated with the degree of mechanical engineer in 1884. From that date until 1897 he served first as instructor and then as assistant professor in the department of experimental mechanics of the Institute. In 1897, he was advanced to a full professorship in charge of the department of experimental mechanics and engineering physics. From 1900 to 1906, he was in charge of the Carnegie laboratory of engineering, which was built from funds contributed by Andrew Carnegie for carrying out a course of instruction to supplement class-room work by practical experiments. Dr. Jacobus developed much original apparatus for use in illustrating the various physical laws and for testing mechanical devices. His investigations formed the basis of an exceedingly large number of papers, which he has presented over a period of many years before technical and engineering societies.

Since his retirement from Stevens Institute as professor emeritus in 1906, Dr. Jacobus has acted as advisory engineer for the Babcock & Wilcox Co., with office at 85 Liberty street, New York. He also continues as a special lecturer in experimental engineering at Stevens Institute. In addition to the American Society of Mechanical Engineers, he is a member of the American Institute of Mining Engineers, American Society for Testing Materials, American Society of Refrigerating Engineers, American Mathematical Society, Society for the Promotion of Engineering Education, American Association for the Advancement of Science, Franklin Institute of Philadelphia, the Engineers' Club and the Railroad Club of New York, and is an associate member of the American Institute of Electrical engineers.

Walter M. Saunders, of Saunders & Franklin, Providence, R. I., delivered an illustrated address on "Molding Sand" before the New England Foundrymen's Association at their monthly meeting to be held at the Exchange Club, Boston, Wednesday evening, Dec. 8. Several experts in molding sand discussed the subject.

Don F. Kennedy, manufacturers' agent, of 1257 David Whitney building, Detroit, has taken over the sales in the western territory of the Hammond Steel & Forging Co., Inc., of Syracuse, N. Y., manufacturer of hammered tool steel bars, die blocks and special forgings. The present office of the company in the Dime Bank building, Detroit, will be discontinued.

Clarence Elmer Postlethwaite, manager of sales of the central district of the Pressed Steel Car Co., with offices in Pittsburgh, has been appointed general sales manager of that concern and of the Western Steel Car & Foundry Co., with headquarters in New York. Mr. Postlethwaite was born at Mt. Union, Pa., and after graduating from the Altoona high school in 1883, became identified with the Pennsylvania railroad, with which he remained until 1890, successively as rodman with the engineer corps, telegraph operator and car clerk. For nine years he was employed in the transportation department of the Norfolk & Western railroad, first as chief clerk to the general superintendent, A. C. Hippey, at Roanoke, Va., and later as assistant to the general agent of that road in Norfolk. He entered the service of the Schoen Pressed Steel Car Co. in October, 1897. The Schoen company later was merged with the Pressed Steel Car Co. Mr. Postlethwaite spent his first few years at the works of the company at Pitts-

CLARENCE E. POSTLETHWAITE,
General Sales Manager, Pressed Steel Car Co., Pittsburgh

burgh, but entered the sales department in February, 1902.

Other promotions announced by the Pressed Steel Car Co. are: N. S. Reeder, elected vice president, with headquarters in New York; J. B. Rider, elected vice president with headquarters in Pittsburgh; J. F. MacEnulty, formerly general sales manager, elected second vice president, with headquarters in New York and H. P. Hoffstot, appointed assistant sales manager of the central district, with headquarters in Pittsburgh. Mr. Rider will continue as general manager in charge of operations.

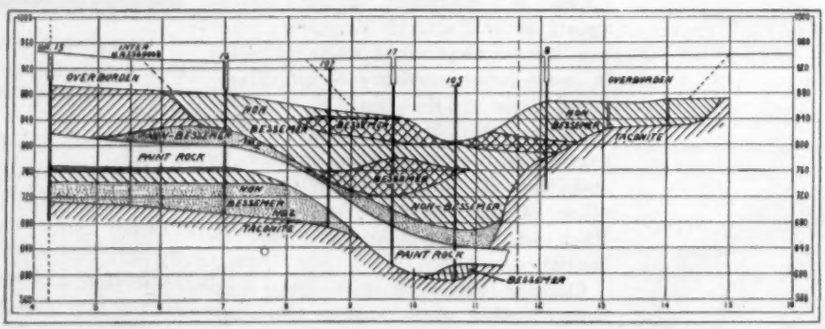
H. W. Porzer, New York, has been placed in charge of the publicity department of the Westfield Mfg. Co., Westfield, Mass., which was formerly the Pope Mfg. Co.

View of Dean-Itasca Pit After Principal Part of Overburden Had Been Removed, But Before Mining Operations Had Commenced

The Dean-Itasca and Pennington Mines

TWO mining properties controlled by the Tod-Stambaugh Co., Cleveland, promise to be important factors during the coming season, the Pennington on the Cuyuna and the Dean-Itasca on the Mesabi. The latter was one of the so-called Hill properties and on Sept. 1, 1914, was purchased by the Dean Iron Co., a subsidiary of the Tod-Stambaugh Co. The Dean mine is a leasehold of the first class carrying an underlying royalty of 25 cents per ton. It contains 8,691,671 tons of iron ore, according to the estimate of the Minnesota tax commission. The Itasca contains 1,469,372 tons. Something over 3,000,000 cubic yards of surface have been removed from this Dean-Itasca property, uncovering the principal part of the ore body, as shown by the illustrations, and a stripping contract for the removal of about one million additional cubic yards of overburden by Sept. 1, 1916, has just been awarded to Butler Bros., of St. Paul, Minn., by the Tod-Stambaugh Co. Work has already been started on this contract which will greatly enlarge the area of the pit and fully develop the open pit ore on the property. When completed the mine can produce 2,000,000 tons of ore in a season if called upon to do so. At the Dean-Itasca pit this year, 486,374 tons of ore have been mined, mostly since Aug. 1. The shipments next year will be considerably greater. The ore is non-bessemer, of good coarse structure.

The Pennington mine, at Ironton, Minn., is the first open pit mine on the Cuyuna. A large amount of overburden has been removed in a very short time. The lease of the mine was taken over by the Pennington Mining Co., a subsidiary of the Tod-Stambaugh Co., in 1912, with J. S. Lutes as manager. Excavation was started in January, 1913, and during the seven months ending with August, 1913, 1,500,000 cubic yards were removed. The first carload of ore was taken out Aug. 2, 1913, and between that date and the closing of navigation in the middle of November, 1913, a little over 100,000 tons were shipped. No ore was shipped in 1914. When the stripping was started, there was some anxiety as to the amount of water to be encountered and as to the angle at which the banks would stand. The material consisted of coarse sand, spots of coarse gravel and a very fine material which when dry has a tendency to blow away with the wind, but, when wet, makes a very sticky substance, hard to handle in the cars. The difficulties were, however, all surmounted. Up to the present time, the ore has been loaded into ore cars direct, but as the ore is taken out and the pit gets deeper, the ore will be loaded into tram cars with a 3-foot cage handled by electric mine locomotives which will be dumped into a skip and the skip hoisted to the surface. A 40R Bucyrus shovel has been purchased for this purpose. It is thought that this small shovel, carrying a 1½-yard dipper, will take care of the output as well as a big shovel could and may be more readily moved about the pit. Frequent shifting of position is necessary according to the grade of ore

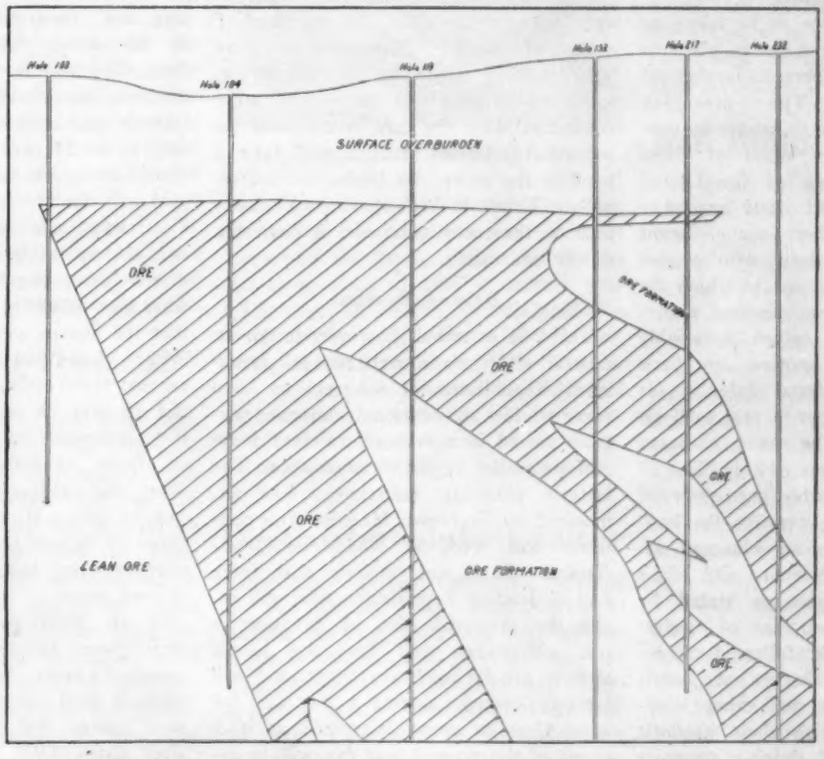


CROSS SECTION SHOWING ORE DEPOSITS OF DEAN-ITASCA MINE ON MESABI RANGE

VIEW OF THE DEAN-ITASCA PIT AT THE END OF THE FIRST SEASON'S SHIPMENTS

in demand. The shipments for 1915 were 120,000 tons, but the pit is now stripped so that from 300,000 to 350,000 tons can be shipped in 1916. The ore is non-bessemer of good structure and is especially desirable for basic iron. The average analysis last year was 59.20 per cent iron, dry.

The Pennington was explored by George H. Crosby and sub-leased by him to the Pennington Mining Co. It is named after Edward Pennington, the president of the Minneapolis, St. Paul & Sault Ste. Marie railway. The accompanying illustrations show the Dean-Itasca pit at two stages of the stripping operations. The line cuts show the formation of the mines, the deposits of the Dean-Itasca being nearly horizontal, while those of the Pennington are nearly vertical.



CROSS SECTION SHOWING ORE DEPOSITS OF PENNINGTON MINE ON CUYUNA RANGE

New Board

Toronto, Dec. 6. — The Canadian shell committee at Ottawa has been abolished, its place being taken by a new organization, to be known as the "imperial munitions board", which will be directly responsible to the British ministry of munitions. The members of the board are: J. W. Flavelle, of Toronto, chairman; Gen. Alex Bertram, former head of the shell committee, deputy chairman; Col. David Carnegie, G. H. Dawson, Victoria, B. C.; C. B. Gordon, president Dominion Textile Co., Montreal; J. A. Vaillancourt, president of the Bank of Hochelaga, Montreal; and E. L. Wood, Toronto. General Bertram and Colonel Carnegie are the only members of the old shell committee who have places on the new board. A commission has also been appointed to inquire into the supply of raw materials in Canada required for the production of war munitions, and the best method of conserving the same. It comprises Col. Thomas Cantley, president of the Nova Scotia Steel & Coal Co., chairman; George W. Watts, Toronto; E. Carnegie, Welland, Ont.; Robert Hobson, Hamilton; Senator W. C. Edwards, Ottawa, and George C. Mackenzie, of the Mines Department, Ottawa.

Lionel Hichens, representing the British minister of munitions, who carried out the scheme of reorganization, states in a letter to Sir Robert Borden the reasons for his action. He explained that the earlier difficulties in the way of shell-making having been overcome, the work of administration had entered upon a new phase and organization was on a large basis.

Business News of Nation's Capital

Various Kinds of Opposition to National Preparedness—Opinions Differ on Methods of Revenue Raising

Washington, Dec. 7.—Facing problems whose importance have never been equalled in the history of the nation, the sixty-fourth congress convened yesterday. Pressing need for high class statesmanship is obvious. Just how well members of congress as a body will meet the standard remains to be seen, but developments of the past week, to say nothing of those preceding that period, are far from offering the encouragement that the business, financial and social interests of the country should have. Conflicting opinions almost without number have forged themselves to the front with regard to all the essential legislative matters that must be solved safely and sanely if the interests of the country at large are to be served. Elements not particularly of a partisan nature are at work in an effort to enforce upon congress demands which are detrimental to the well being of the nation and ought to be stamped out before they make further headway, in order that constructive policies might be fully discussed and enacted into law. Honest differences of opinion always did and always will exist, as they should, but the line between this kind of expression and its opposite is sharply drawn and requires no special foresight to be discerned.

The foremost question to be taken up by the present congress, as is plain to every right thinking person, is that of national defense. The prevailing thought if the country is unable to conceive of the state of mind of those opposing the fortifying of the United States so as to protect itself against a foreign invasion. There are different classes even among those who oppose such a condition. The one to which the most attention has been directed naturally enough is that which invariably charges that ulterior motives are back of the plan for national defense. It will be interesting, after a real analysis of the situation can be made, to learn the strength in congress of this class of members. No one who has observed the matter closely can question the honesty of purpose of some who are opposed to national defense, and their position on the subject as stated by them, even though their line of reasoning cannot be possibly followed or accepted. But where charges are made against manufacturing and other interests in connection with their patriotic support of a national defense program ought to be made specific and those making them compelled to either prove them, or, in failing to do so, remain silent hereafter. So far, there has been a plethora of generalities included in such charges and an absolute dearth of concrete facts.

Because it is vigorously following its policy of advocating national defense, the navy league is being attacked bitterly by different foes. Sharp letters have passed between Col. Robert M. Thompson, of Washington, president of the league, and Representative Clyde H. Tavenner, of Illinois, who, in and out of season, has assailed what he styles the "armor plate ring", munition makers, and urged government manufacture of all materials entering into war necessities. Mr. Tavenner comes from Cordova, Ill., and in his district is situated the Rock Island arsenal, where he wants the government to erect an armor plate plant.

Mr. Tavenner's campaign is only one of several which may be expected to be projected into the national defense program, and therefore emphasizes the need of a firm and wise policy on the part of congress in handling the question.

Another of the factors which is insisting upon entering into the preparedness fight is at least one element of organized labor. Announcement has been publicly made by the committee, made up of some of those who were connected with the late commission on industrial relations, that it will take a hand in the game. Its leader, of course, will be Frank P. Walsh, who was chairman of the commission and is chairman of the committee.

Raising Revenue

There is expected, however, to be an earnest effort made on the part of prominent Republicans in congress to have revenue for the national defense program raised in a manner different from that suggested by the administration. The latter's plan, in substance, was announced by Secretary McAdoo and published last week in *The Iron Trade Review*. It is not unlikely that there will be leading Republicans who will insist the proposed plan of taxation is not well taken and that the people already are facing heavy taxes, and will have to continue paying a war tax for some time to come, inasmuch as it is expected the present war tax will be reenacted at once as a preliminary to further taxation. It is apparently the belief of these Republicans that the logical thing to do is either to issue Panama canal bonds, or revise the tariff upward, both of which plans are known to be opposed by the administration. Further than retaining the present duty on sugar and probably enacting an antidumping clause, no change in the present tariff is expected to be made at the present session of congress. But because there is an apparently important split within the ranks of the Democrats in both houses on national preparedness, Republican aid promises to be necessary to get a defense program through, and therefore the minority, which is only 25 less than the majority in the house, gives signs of making action on its suggestion necessary. It seems certain President Wilson will face a most thorough test in getting legislation he desires through this congress. The fight over a form of cloture denotes great possibilities of a breakdown within the ranks of the Democrats in the senate.

Carnegie Low on Steel

Washington, Dec. 7. — The Carnegie Steel Co. was the lowest bidder on all grades of steel, except nickel steel, castings, and rivets, for battleships 43 and 44, for which bids were opened last Friday by the bureau of supplies and accounts, navy department. Secretary Daniels estimated that the prices were only about 25 per cent higher than the figures at which awards were made one year ago for structural material for the CALIFORNIA, and appeared to be pleased that the figures were no higher. Immediately after the bids were opened, it was the belief of department officials that the figures were 40 per cent higher. After closer analysis, however, they revised their estimate and said it would not go over 25 per cent. Not only did they apparently expect figures in excess of those submitted, but indicated a fear that delivery requirements could not be met. However, all bidders offered to deliver the material within the time required, ranging from six months to two years.

In all, 34,200 tons of structural material were involved in the bids, the principal items being 12,780 tons of medium steel plates, 4,850 tons of nickel steel plates, 800 tons of high tensile steel plates, 4,996 tons of medium steel

angles, 1,500 tons of medium ship channels, 4,992 tons of special treatment plates, 900 tons of steel castings, and 1,797 tons of the two classes of rivets.

The Carbon Steel Co. was the lowest bidder on the nickel steel at $0.559 per pound, the American Steel Foundries was lowest on steel castings at 6c per pound, and the Pittsburgh Screw & Bolt Co., and H. A. Wagner were lowest on the rivets. On all other grades of material, the Carnegie company was the lowest and was the only bidder on shapes. The Carnegie bids on medium plates ranged from 1.625c to 1.825c per pound, on high tensile plates, 0.263c to 0.2645c per pound, and on shapes, 0.1625c to 0.179c per pound, and on special treatment plates 0.816c to 0.1125c per pound.

Secretary Daniels says he feels confident that the vessels can now be built in government navy yards, a thing which appeared improbable when it was thought prices were 40 per cent above those for material for the CALIFORNIA. The figures show, he said, that the navy yards could get the structural material at slightly less than they figured on. The principal items were bid on by the Carnegie company, the Carbon company and Worth Bros. Co. Altogether there were 11 bidders, the Bethlehem Steel Co. being among the list.

Compared with practically the same items purchased for the CALIFORNIA, being built at the New York navy yard, the price for structural material for each of the new vessels, according to Mr. Daniels, is $251,723.50 more,, or about 25 per cent higher. The price charged for structural material for the CALIFORNIA was $994,114 and the price quoted for the same materials for one of the battleships under consideration for building in a navy yard is $1,245,837. It is Mr. Daniels' intention to have the two ships built at the Mare Island, Cal., and Philadelphia navy yards, But before this can be done congress will have to appropriate large sums to enlarge the ways at both yards.

A Surprising Proposal

Washington, Dec. 7. — Indications point to early action by the interstate commerce commission in passing upon the application of railroads to establish a rate of 55 cents per 100 pounds on iron and steel articles from the Pittsburgh district to Pacific coast terminals. Arguments on the application were made last Friday. Attorney Fred H. Wood of the Southern Pacific appeared on behalf of the rail lines, while Attorney Frank Lyon represented the American-Hawaiian Steamship Co., and the Luckenbach Steamship Co., interveners, which are opposed to granting of the application.

Mr. Wood made a somewhat surprising proposal when he suggested that, in view of the Panama canal being closed, the commission might make its order provide that the lower rates would not be applied until after the canal has been reopened, if it does conclude to grant the authority asked. If it is granted it will mean that the railroads can establish the 55-cent rate without observing rates to intermediate points.

It was averred by Mr. Wood that it is the direct water competition that the railroads are asking the privilege of meeting, and none other. Figures were submitted by him to show that the Sunset-Gulf route has lost 85 per cent of its trans-continental business since the fiscal year, after the Tehauntepec route had been opened. In that year,

ADOLPHE GREINER

he said, the line he represented, which operates a steamship line between New York and Galveston, Tex., carried 196,000 tons, while in 1915 it carried only 6,518 tons. In 1908, it was declared, the ocean traffic amounted to 48,985 tons, while in 1915 it totaled 296,700 tons. He insisted the railroads had a right to bid for the business without being penalized by the lowering of the intermediate rates.

Death of Adolphe Greiner

Adolphe Greiner, managing director of the great John Cockerill steel works, Seraing, Belgium, died at his home in Liege, Nov. 20. Mr. Greiner was president of the Iron and Steel Institute and at the time of its last meeting in London, in September, he was reported seriously ill with enteric fever. He had been unable to attend the meeting in the preceding May and it was reported that he was busily engaged in relieving suffering in his afflicted country.

Mr. Greiner was 71 years of age. He had been connected with the Cockerill works more than 50 years and during half of that time had been managing director. He was one of the first to adopt the blast furnace and coke oven gases for the generation of power in iron and steel works and his company adopted the basic bessemer process under his directorship. When he assumed the office of president of the Institute in May, 1914, his presidential address was of a very high character. He discussed coke ovens and coke oven gas and by-products. He was the second foreigner honored with election to the presidency of the Institute, the other being Andrew Carnegie, who was president from 1903 to 1905.

Obituaries

George J. Maas, of Negaunee, Mich., died Dec. 2, aged 54 years. He was well known in the iron mining world, where he did much exploring and developing. He produced a number of inventions which he patented, one being an instrument to determine the direction taken by a diamond drill bit, which is used the world over. He was born at Marquette, Mich., and had lived in Negaunee since he was three years old.

Martin P. Cockey, sales agent, New York City, for the John A. Roebling's Sons Co., wire manufacturers, died at his home in that city on Nov. 29, aged 51 years.

Will Build Armored Train

A group of steel makers and other business men, headed by Elbert H. Gary, chairman of the United States Steel Corporation, and Charles M. Schwab, president of the Bethlehem Steel Corporation, are contributing toward the presentation to the military department of the State of New York, an armored motor train for use in the maneuvers of the National Guard of the state. This train will be the first of its kind to be built in this country for home use. A principal feature of the train will be a battle car heavily protected with armor plate. In addition, there will be six or seven lightly armored cars equipped with machine guns and capable of high speed which will be suitable for scout work. Judge Gary, Mr. Schwab and other steel makers have promised to contribute and to furnish the armor plate and other metal parts of the train at cost price.

News of Employers and Employes

Domination of Union Labor Seriously Interferes With Progress on the Pacific Coast—Meeting of California Foundrymen's Association

(*Special Correspondence.*)

San Francisco, Dec. 3.—The iron trade on the Pacific coast is different from any other section of the country. Here is an extensive and prosperous region boasting several millions of people and a considerable foreign commerce with the Orient, the East Indies, South Sea islands, Canada, Alaska, and Latin America, and with great mining and industrial enterprises on all sides, but with practically no appreciable iron and steel supply within hundreds, almost thousands, of miles. In fact, much of its iron and steel comes several thousands of miles to reach the coast region, steel supplies around the Horn, across Tehuantepec, through the canal or by rail from Pennsylvania or Chicago mills; pig iron from similar sources or from China. Thus, the Bethlehem Steel Co. does a large business here in selling structural steel; the Midvale Steel Co. carries a big stock of tool steel in California; the Union Iron Works (a Bethlehem Steel auxiliary) imports a good deal of pig iron from China. Incidentally the Union Iron Works of San Francisco is increasing its plant to enable it to handle the large contracts for ship building secured recently. It will be recalled that this company, essentially a ship builder and repairer, has built many famous warships from as far back as the old CHARLESTON in the 80's, the OLYMPIA, Dewey's flag ship, and the OREGON, as well as several more modern battleships and cruisers, including one for the Japanese navy. About 4,000 men are now employed by the Union Iron Works, and things seem very prosperous at the plant. Secretary Daniels has approved the plans for a new dry dock to be built by this company at Hunters Point, San Francisco; it will accommodate the largest battleship built or building.

It is true that a little steel is manufactured in Washington, but Washington coal is not of the coking variety; and attempts deserving of a better success have been under way at Heroult, Shasta county, in northern California, where the Noble Electric Steel Co. has been experimenting on an extensive scale in reducing California iron ores, of which there is undoubtedly a plentiful supply. More lately, the Noble company has turned to making manganese and chrome iron. The great drawback to iron and steelmaking on the Pacific coast aside from lack of coking coal is the extremely high cost of labor. This is a factor that is unmistakably a stumbling block in the path of all new enterprise on the coast.

The unions are particularly strong in San Francisco and the bay cities. In the north at Seattle, Portland and Spokane, ideas tend more toward personal liberty and individual initiative, while in the south around Los Angeles, the union spirit has not obtained the foothold it has at San Francisco. In the latter city, machinists are just now receiving a minimum of $3.75 per eight-hour day, but, according to a contract entered into some time ago, they will in a week or two begin receiving a minimum of $4, which agreement is to continue for about two years. To indicate the close organization and activity of the unions around San Francisco bay, a well-known man in the metal trade in California who rose from machinist successively to foreman, superintendent and partner in a machine shop business, spoke as follows:

"If circumstances should compel me today to go out and earn my living by working as a journeyman-machinist, I should have to give up that supposedly great American heritage of freedom and individual liberty to become subservient to a union."

The Foundrymen's Association

The California Foundrymen's Association, of which Harry F. Davis is secretary, held its first annual meeting on Nov. 18, at the offices of the association, at 503 Market street. Although this organization has been existent for 20 months, this was the first annual meeting, due to an oversight a year ago. Organized in March, 1914, the Foundrymen's Association was an off-shoot of the California Metal Trades Association, a much bigger body, of which Chas. A. Smith is secretary. The foundrymen believed that greater efficiency and better results could be secured by a separate organization that would render its activities more self-contained and flexible. At the meeting, the following officers were elected: Executive committee—Nathan Alper, H. C. Macaulay and John J. Young. Chairmen of standing committees—John A. McGregor, association affiliations; James W. Kerr, association policy; Nathan Alper, brass foundries; Edward J. Fowler, commercial matters; Charles Kingwell, costs; Andrew L. Kerr, credits; Charles D. Steiger, entertainment; Charles P. J. Hoehn, materials; Secretary Davis, membership; Davis Guild Jr., records; John Hedley, shop conditions; H. H. Whiting, steel foundries.

The report of the retiring executive committee was in part as follows, made by John Hedley, H. C. Macaulay and John J. Young.

"The California Foundrymen's Association was organized by eight shops, each one of which continues to hold its membership therein. We earnestly suggest that early action be taken in the matter of costs. We heartily recommend that members make more use of the credit bureau of the association, and wish it known that we warmly favor an effort to make prices for castings conform with increased prices that must be paid for pig iron and other raw materials."

Secretary Harry F. Davis announces that the annual dinner of the association and installation of officers will be held on Dec. 11 at the Union League Club. It is interesting to note that the association has exactly a dozen members; the original eight are: Empire Foundry Co., Enterprise Foundry Co., H. C. Macaulay Foundry Co., Pacific Foundry Co., Phoenix Iron Works, Standard Brass Casting Co., Steiger & Kerr Stove & Foundry Co., and the Western Foundry.

In addition are the following: Best Steel Casting Co., Kingwell Brothers, Thompson Brothers and Union Iron Works.

At one time since its organization the association enjoyed a membership of one dozen and a half. Those who belonged and resigned are: Ajax Brass & Iron Works, Joshua Hendy Iron Works, Rincon Foundry Co., Rudgear Merle Co., San Francisco Stove Works, United Iron Works.

It was remarked with interest at the meeting that prominent eastern and middle western companies have adopted the eight-hour day, such as the New England Westinghouse Co., Toledo Machine Co., United States Cartridge Co. of Lowell, the Studebaker Corporation of Detroit, and

many shops in New York, Perth Amboy, Springfield, Mass., Wilmington, Bristol, etc. It is probable that the parent organization, the California Metal Trades Association, pays more attention to labor matters than the foundrymen. The larger body is primarily for collective bargaining between employers and the unions over labor troubles. In case of a threatened strike, the employers through the Metal Trades Association have achieved favorable results by prompt bargaining with united purpose.

Incidentally it is regretted that the recent apprenticeship bill failed to pass the California legislature. The unions, as matters now stand, are frequently able to limit apprentices to one for every five or seven workmen in a given shop. This is unjust, becaus many apprentices drop out after several months or a year of training and then, too, a number of smaller shops have no time or place for teaching apprentices. Hence good, all-around machinists are becoming scarce and too great limitation of apprentices is making for a condition approaching a caste.

Chicago Indictments

Chicago, Dec. 7.—Final roundup after a long investigation of alleged blackmailing tactics by representatives of labor unions in Chicago has come in the return of indictments against 54 men by the Cook county grand jury. The indictment against each man contained 46 counts. The charges are that the accused have been labor sluggers, crooked business agents of unions, manufacturers participating in this crooked work or members of unions conspiring to do illegal acts.

More than a year has been consumed in obtaining evidence and putting the matter in shape to clean up the situation. Commenting on the indictments, States Attorney Maclay Hoyne says that the men under indictment are not labor leaders. He calls them a disgrace to union labor and says that they worked solely in their own interest to extort money from their victims.

The state attorney's office has asked that in view of the multiplicity of offenses, bail be placed at $195,000 for each defendant. The indictments allege that the city of Chicago was divided into nine districts, over each of which one man possessed the power of placing on a blackmail list or unfair list the names of persons to be blackmailed and these names could be removed only after the representative in charge was "satisfied". It is alleged that a series of blackmailing demands resulted from this and that certain manufacturers refused to furnish material to persons on the blacklist. Refusal to contribute blackmail is said to have resulted in destruction of property and other forms of violence. A saloon on West Madison street is said to have been headquarters for the blackmailing gang, with special facilities for meeting victims and collecting contributions.

The general plan as outlined in the indictment was as follows:

A man hired a contractor to build a house. The contractor was not on the best of terms with a business agent of some union, electricians, fixture hangers, painters, glaziers, lathers, sheet metal workers, but got along rapidly. Suddenly a strike was called.

On making inquiry he was told of some non-union material being used, or given some fictitious grievance. He was informed the trouble could be settled at any figure between $10 and $10,000, usually about $500. If he argued, the price was increased. If the building's address once got on the unfair or blackmail list, no other one of the allied unions would touch the job.

If the contractor or owner held out against paying graft, the place was set afire, wrecked or chopped to pieces. If there was glass in it, an auto would draw up at night and its occupants would hurl bricks, stones or iron rivets through it. No glazier would replace that glass and no insurance man would take premiums on it until the name went off the unfair list.

The indicted men include the business agents of a lather's union, electrical unions, painters' unions, two plate glass store owners, several bar tenders, a president of sheet metal workers, a manufacturer of electrical supplies and numerous alleged sluggers.

Engaging Employes

The Norton Co., and Norton Grinding Co., Worcester, Mass., are to put into effect shortly a radical departure in the manner of engaging help and it is thought it is one of the first of the large concerns in the country to inaugurate such a policy. The employment bureaus of both companies have been combined with the educational department of each, and as soon as the new plan goes into effect, every new applicant for a job will have to pass muster with Elmer H. Fish, head of the educational department, before he can go to work for either company. The employment division will require that the applicants be thoroughly examined as to their physical qualifications by the health and sanitation department in the same way as at present, except that the entire examination will be made at one time. If they pass these tests, they are taken to the department which asks for them, introduced to the foreman, the work explained to them, and if they prove acceptable to him, they are finally hired and set to work. All cases will be investigated by the department, and every effort made to place the men in positions where they will be efficient and contented. In case of sickness, the employe will report to the hospital for re-examination before going to work. Those who leave voluntarily will be interviewed by members of the department to determine the real reason for their wishing to leave. Hiring will be based on physical and mental ability sufficient for the job in hand.

Many Busy Plants

Unemployment has been banished from Providence, R. I., because of war orders and general business improvement. Machine shops, screw and tool factories have 11,375 more men at work than a year ago, in spite of numerous strikes. Jewelry factories in Attleboro, Mass., are 60 per cent busier than this time last year. In Olneyville, a part of Providence, mills are employing 2,500 more hands on full time than a year ago, and 1,000 are working day and night. In the Blackstone valley, between Providence and Worcester, 7,095 hands are employed in cotton mills and the bleacheries and dye works are running 100 per cent better than a year ago.

Will Tax Steel Requirements

Toronto, Dec. 7.—Gen. Alex. Bertram, lately chairman of the Canadian shell committee, states that so far Canadian shell orders from Britain total 20,000,000 shells, the money value being estimated at $220,000,000. Additional orders are expected before the end of the year amounting to $180,000,000. So far deliveries of shells from Canada have aggregated about 3,500,000 shells. He estimates that to fill the orders already placed and those anticipated as above, there will be required 45,000,000 pounds of copper and brass, 1,500,000 pounds of tin, and 800,000,000 pounds of steel.

The Memphis Steel Construction Co., First National Bank building, Pittsburgh, has moved its offices to Greensburg, Pa., where its plant is located.

Iron and Money: Fact and Comment

Bears Are Lions on Market—German Exchange Touches Lowest Point Yet—Thompson Blamed for Own Troubles

BEARS played a rather prominent part in the stock market last week and numerous industrial shares recorded a slight net loss, but there was nothing in the situation to cause alarm.

There was much uncertainty in the market Monday and losses predominated. Favorable reports of the railroads had no appreciable effect. The reports of the Erie, the St. Paul and the Southern for October showed decided gains. The action of the Canadian government in commandeering 20,000,000 bushels of wheat at home ports naturally aroused some discussion.

Variations Unimportant

Fluctuations in the market Tuesday were not important. American Locomotive advanced, following the statement of an official that earnings for the fiscal year to end June 30 would be very favorable. The Canadian Pacific reported a gain of $3,250,000 in October earnings, due largely to the movement of grain.

The market was dull Wednesday until the last hour, when considerable weakness developed. It was announced that the $60,000,000 of B. & O. bonds had been over-subscribed three times.

Thursday depreciation in German exchange to the lowest figure ever quoted in this country was reported, but it had no serious effect. The speech of President Vanderlip, of the National City Bank, in which he said that possibly before the war ends foreign purchases in this market will have to be curtailed, because means of payment may be lacking, had a somewhat depressing effect, although there was nothing sensational or remarkable about the statement.

Gloom disappeared for the most part Friday and advances were general. The Texas Co. and General Motors were among those that made gains. The demand for rail stocks was more active.

Market Strengthens for Week-End

The market closed Saturday noon with an increase in strength. Dullness of the early part of the session disappeared during the last hours. Steel stocks were stronger.

Quotations at the close of business Dec. 4 and changes in the leading stocks identified with the iron and steel industry for the week are shown in the following table:

	Close Dec. 4.	Net chg.
American Can	61⅛	—1⅝
American Can prfd.	110	—1½
Amer. Car & Fdy. Co.	82	— ⅝
Amer. Car & Fdy. Co., prfd.	118	+ ⅞
American Locomotive	70⅜	— ⅜
American Locomotive, prfd.	102¾	—1½
American Steel Foundries	62½	+ ⅞
Baldwin Locomotive	114⅜	—1⅝
Baldwin Locomotive, prfd.	111½	— ½
Bethlehem Steel	470	—5
Bethlehem Steel, prfd.	160½	—1
Colorado Fuel & Iron	51½	—1¼
Continental Can	89	— ¾
Continental Can, prfd.	109	+1
Crucible Steel	74	—1
Crucible Steel, prfd.	111	— ½
General Electric	175⅞	—1⅜
International Harv. of N. J.	108¼	—2
Inter. Harv. of N. J., prfd.	118	— ¼
Inter. Harv. Corp.	72⅛	+2⅜
Internat'l Harv. Corp., prfd.	106	+10
Lackawanna Steel	84	+ ½
Nat'l Enamel. & Stamp. Co.	30	+ ⅜
Nat'l En. & Stmp. Co., prfd.	94½	+ ½
Pressed Steel Car	64½	—1
Pressed Steel Car, prfd.	105⅛	— ⅛
Pullman Palace Car	167½	— ½
Republic Iron & Steel	52⅞	+1⅜
Republic Iron & Steel, prfd.	109⅝	.....
U. S. Cast Iron Pipe & Fdy.	25¾	— ¼
U. S. C. I. P. & F., prfd.	50	—3½
United States Steel	86¼	—1
United States Steel, prfd.	115¾	— ⅛
Westinghouse Mfg.	69	— ¾

The following table shows changes in the maximum quotations of stocks not listed on the New York stock exchange:

	High Dec. 3.	High Nov. 26.
American Radiator	375	372½
American Ship Building	38	39
Cambria Steel	79¼	70
Chicago Pneumatic Tool	83	83
Inland Steel	335	....
LaBelle Iron Works	53½	54½
Lake Superior Corpn.	10	10
Pennsylvania Steel	64⅛	63
Stewart-Warner Speed. Co.	91½	92⅞
Warwick Iron & Steel Co.	10¼	10⅜
Westinghouse Air Brake	140	140
Westingh'se Elec. & Mfg. Co.	70	70¾

Who's to Blame?

That J. V. Thompson, former banker and coal land owner, Uniontown, Pa., cannot lay his financial troubles at the doors of corporations engaged in the manufacture of steel and coke, was the claim made last week by Attorney Frank P. Rush, who spoke before the Uniontown creditors of Mr. Thompson. He declared that the Thompson failure was brought on by Mr. Thompson himself, and claimed that corporations were being attacked for the purpose of blinding creditors to actual facts. Attorney W. C. McKean, during the debate over the adoption of a resolution to organize the Thompson creditors' association, held corporations partly responsible for the tangled affairs of Thompson.

It has now developed that there are a number of large claims in West Virginia and Pennsylvania about to ripen into valid liens. Creditors are anxious to obtain all the facts in the case and some of them favor greater publicity.

Another suit was filed yesterday against Thompson to recover $15,000 on a promissory note by William H. Beeser. It is alleged the note was given Dec. 1, 1914, only a short time before the First National Bank of Uniontown closed its doors. Something like 3,000 suits against Mr. Thompson are pending.

Echo of 1913

The Dayton Coal, Iron & Railroad Co., Dayton, Rhea county, Tenn., has been adjudged a bankrupt in federal court at Chattanooga. The total indebtedness was found to be $1,640,000. Assets were placed at $1,200,000, with an outstanding mortgage to secure bonds of $600,000 held in Scotland, against assets. This action is an echo of the failure of James Watson & Co., Glasgow, Scotland, in June, 1913. This Scottish firm was one of the oldest and largest pig iron houses in the world; it dealt heavily in Middlesbrough warrants. Its attempt to corner the market in Middlesbrough warrants is said to have led to its failure. In addition to their activities as merchants, James Watson & Co. were interested in blast furnaces and steel works in Glasgow as well as controlling the Dayton Coal, Iron & Railroad Co. in this country. The two blast furnaces of the Dayton company have not been operated since the foreign company failed. These two stacks were completed in 1885 and have a total annual capacity of 90,000 tons. Connected with the furnaces were 375 coke ovens with an annual capacity of 120,000 net tons.

Active Shares

The Maxim Munitions Corporation, New Haven, Ct., capitalized at $10,000,000, placed 785,000 of its 1,000,000 shares on the Boston curb exchange, Nov. 29, and it has been largely dealt in since. The stock gave a good account of itself in New England, touching 15¼, the par value being $10. The remaining 215,000 shares will be kept in the treasury. The corporation has accepted plans for additional factory buildings at its plant. The machinery for these additions which has been contracted for and delivery of which will be coincident with the completion

of the factory will cost $370,000. The corporation has also bought the plant of M. Seward & Sons Co., in New Haven, and will use it as an auxiliary to its main factory in Fair Haven. It is a three-story brick building and is equipped with machinery essential to turning out the parts of guns where forging is required.

A Second Dividend

Milwaukee, Wis., Dec. 7.—A second dividend, amounting to 15 per cent, was declared at a meeting of creditors of the defunct Prime Steel Co., Milwaukee. Hope that the industry would not be lost to Milwaukee has been shattered by the announcement that Harris Bros., Chicago, who purchased the two foundries, known as the Dutcher and the Crucible works, have abandoned attempts to effect a reorganization and continue the business, and are about to sell the stock and equipment in parcels. The plants are being dismantled.

Buys Worcester Company

Boston financial interests headed by Robert F. Herrick, who holds more offices in manufacturing and industrial establishments than probably any other man in New England, have bought the entire $750,000 worth of common stock of the Reed-Prentice Co., machine tool maker, Worcester, Mass., which gives them control of the business. The new owners organized Nov. 26, by the election of the following officers and directors, the former having resigned: President, Robert F. Herrick, Boston; vice president and general manager, Albert E. Newton, Worcester; clerk and treasurer, Jeremiah J. Macklin, South Boston; general counsel, Charles M. Thayer, Worcester; directors, Robert F. Herrick, Malcolm Donald, Robert C. Morse, Henry P. Kendall and George C. Lee, all of Boston; Frank A. Drury, Dr. Homer Gage and Albert E. Newton, all of Worcester. Assistant Treasurer Henry H. Knapp also resigned to take effect Jan. 1. Some of the officers are temporary and permanent ones will be chosen later. No changes in the operative management is contemplated. The retiring officers are: President, Lucius J. Knowles; treasurer, George Crompton, also as directors, and Harry Worcester Smith and Charles M. Thayer as directors. The company is a $2,000,000 Massachusetts corporation and does a business of $1,000,000 a month. It has unfilled orders amounting to $3,000,000. Since the European war the company has been rushed day and night making lathes, many of which have been shipped to Russia, France and England. A machinists' strike at the plant Sept. 22, when between 800 and 900 men walked out has seriously interfered with business, but some of the old men have come back and these with new employes, give the company a little more than 500 men at present. The company is paying a war bonus of about 20 per cent in addition to wages and the men are receiving more money than what they demanded at the time of the strike.

Financial Note

Stockholders of the Cleveland-Cliffs Iron Co. at a special meeting just held in Ishpeming, Mich., authorized an increase in the capital stock from $5,000,000 to $10,000,000 and authorized the directors to make disposition of the new stock, which they will do some time this year. The company resumed dividend payments in October after discontinuance about a year, the resumption being on a 10 per cent annual basis. Stockholders have been notified of a plan to issue $3,500,000 of collateral trust 6 per cent bonds to reduce floating indebtedness and provide for future requirements. The company's balance sheet as of Sept. 30 this year shows totals of $29,875,634, property assets being listed at $18,581,197, investments at $11,294,437 and surplus at $20,058,204.

Opens New Works

The Knox Pressed & Welded Steel Co., Pittsburgh, manufacturer of water-cooled specialties, is now operating its new plant at Wheatland, near Sharon, Pa. This plant has the capacity for turning out all of the special lines of products made by the company in the past, together with a very considerable tonnage of other steel plate structures. The plant at Farrell, Pa., is being abandoned and all the tools, together with much new equipment, is being installed at Wheatland.

This plant will handle steel plate construction of the heaviest character, being equipped with tools for drilling, planing and forming both light and heavy plates. The hydraulic press and riveter installation is particularly notable, the presses being of large capacity and admirably suited for turning out the complex forms required by the company's water-cooling installations, as well as pressed work required in other steel plate construction.

The Wheatland plant is admirably designed. The raw material is received at one end of the shop, passing through during the process of fabrication to the shipping tracks, which are located at the other end of the building. Power is delivered at high tension from a public service corporation. All tools are electrically driven and served by E. O. T. cranes. Well lighted and commodious locker rooms are provided for the men.

The special line of products made by this company includes water-cooled doors and frames for open hearth and other types of heating furnaces; water-cooled skewbacks, buckstays, port coolers, reversing valves, flue dampers, furnace shields, tin mill floors, glass tank jackets, water backs and similar devices made of pressed and welded steel plates. In addition, the company makes a full line of tanks, stacks, ladles and handles a general line of steel plate construction. It also has devoted considerable attention to autogeneous welding and is using both the oxy-acetylene and electric arc methods.

Toledo Plant

May be Sold for $4,000,000 to an Eastern Syndicate

Toledo, O., Dec. 7.—If present negotiations go through, the Toledo Machine & Tool Co., on Dorr street, will be sold early in January for $4,000,000. The identity of the purchasers has not been disclosed, but it is known they represent an eastern syndicate. Stock holders have been requested to deposit their stock with the National Bank of Commerce. The Toledo Machine & Tool Co. is one of the largest industrial plants in Toledo, and the largest of its kind in the country, and is capitalized at $1,200,000. All of the stock is held by Toledo people. Henry J. Hinde is president. Those directly connected with the concern are doing little talking but it has been stated that the concern is not being purchased either for the allies or Germans and would not engage in the manufacture of munitions. It has also been stated publicly that the company will continue under the same management as at present, with the addition of a few more directors, representing the purchasing interests.

The City Foundry Co., on Hasting street, it is announced, is preparing to expand and will soon be incorporated. The concern, though small, is one of the model institutions of its kind in the state and was established five years ago. The owners, directors and managers are J. C. Burt and John Holzscheiter. The stockholders will be increased in numbers and officers will be designated when the business is incorporated in February, but the two families will continue to hold the stock.

Russia Takes Lead in Tool Buying

English Demand Slackens as British Plants Speed Up—Ship Yards Enter Market —Crane Builders Busy—Rolling Mills Extend Capacities

THE feature of the machine tool market at present is the active buying of equipment for shipment to Russia. That country now is the source of business which appears to be greater in volume than that from all the other European countries combined. The Russian demand involves not only lathes, but practically a general line of machine tools. These are being placed for the earliest possible delivery, which, in the case of some of the machine tools involved, is as far as four or five months ahead. Another important feature of the market is the growing belief that purchases of machine tools for shipment to England hereafter will be of comparatively small proportions. This belief is based not only on the diminishing demand from England which has been noted during the past few weeks, but on reliable reports from London. One large machinery concern has been advised by its London representative that the development of war munition-making plants throughout Great Britain has been pushed to such an extent that the output of ammunition seemingly is in proportion with the requirements in the war zones and, as a result, the need of new machinery suitable for making munitions, rapidly is becoming less urgent. Advices received from London sources and substantiated by developments in this country, also indicate that new contracts for munitions in the future will be much less generally available than in the past.

Ship Yards and Railroads Inquire

Demand from domestic munition makers continues active, but, with only a few exceptions, the orders placed involve only a few tools at a time. The largest recent buying by domestic interests appears to have been that of the Bethlehem Steel Co., which, in addition to a large number of big projectile lathes, placed orders for other equipment. It is understood this company now has completed the buying of equipment to replace that recently wrecked by fire in the No. 4 machine shop. The ship building companies continue to be active purchasers and included among the buyers of this character is the Continental Trading Co., which is buying through the General Erecting & Improvement Co., 9 East Fortieth street, New York. It is expected that the Standard Ship Building Co., 8 Bridge street, New York, shortly will begin to buy equipment for its prospective plant at Shooters island, near Paterson, N. J. Automobile concerns continue to place fair orders and considerable additional business has come from some of the railroad carmakers. There also is a rather active demand from some of the oil companies, particularly for pipe cutting and threading machines. Some further scattered business, involving a good total, has come from eastern railroads. These interests, however, are buying as sparingly as possible, due to the present high prices which, in general, are 15 to 50 per cent higher than at the outbreak of the war. A number of railroads have issued good-sized lists, including one from the Baltimore & Ohio, involving 15 to 20 tools and one from the Delaware & Hudson, involving about 40 tools. The latter road has intimated it will wait for more favorable prices before closing this business. The Pennsylvania railroad last week bought a large gate shear for its Altoona shops.

Demand for cranes is active in the east. The Midvale Steel & Ordnance Co., Philadelphia, is in the market for ten 5-ton cranes; the Newton Machine Tool Co., Philadelphia; the Lorain Steel Co., Johnstown, Pa.; the Robins Conveying Belt Co., New York; the Lancaster Iron Co., Lancaster, Pa., all are in the market for one 10-ton crane each; the Philadelphia Steel & Forge Co., Tacony, Pa., is inquiring for one 25-ton crane; the Bethlehem Steel Co. has out inquiries for a number of cranes. The Maryland Steel Co. has placed an order for a 10-ton, single-leg gantry crane. Prices now being quoted on cranes range between 15 and 25 per cent higher than those quoted six months ago.

Among eastern concerns who are expanding their capacity are the Harlan & Hollingsworth Corporation, Wilmington, Del.; Pennsylvania Forge Co., Philadelphia; Wright Wire Co., Palmer, Mass.; Splitdorf Electrical Co., Newark, N. J.; Empire Metals Products Co., Irvington, N. Y.; Chevrolet Motor Co., Tarrytown, N. Y.; Driver-Harris Wire Co., Harrison, N. J.; Stafford Co., Readville, Mass.; Pequonnock Foundry Co., Bridgeport, Ct.; Balbach Smelting & Refining Co., Newark, N. J.; Blakeslee Forging Co., Plantsville, Ct., and others. Henry Ford, automobile manufacturer, has purchased 80 acres near Newark, N. J., and will erect a plant thereon.

Second-Hand Tools Moving

Machine tool dealers in the Chicago district find conditions unchanged and demand unabated. Practically nothing can be done on new machinery, as labor troubles interfere with deliveries. Practically the entire business now is in second-hand material. This market has been so thoroughly covered that it is difficult to find tools. A manufacturer some time ago took two screw machines while waiting for some automatics, and during the past week disposed of them on the market at a considerable advance over their cost. The dealer taking them sold them for $300 over their original cost to a second dealer, who disposed of them at a still higher figure. Considerable inquiry is still coming from Canadian sources and buyers are visiting this market constantly, but with little success. Domestic users of machinery are inquiring for considerable supplies and most inquiries are urgent.

Pittsburgh Market Active

Selling of rolling mill and machine shop equipment in Pittsburgh is more active as the end of the year approaches. Machine tool dealers, all of whom have been swamped with business the last nine months, are unable to promise deliveries of some types of machinery before next April or May. The Heppenstall Forge & Knife Co. has purchased two 32-foot span, 5-ton, three-motor, electric traveling cranes from the Pawling & Harnischfeger Co., Milwaukee. The American Sheet & Tin Plate Co., which has bought six cranes for the new addition at Gary, Ind., has entered the market for an additional 10-ton crane.

Drawing a Correctly Soaked Ingot from the Pit

Mellowing the Ingots

The great importance of the Soaking Pit in the manufacture of superior steel is often overlooked. The Soaking Pit should be more than just hot storage.

Realizing this, in the manufacture of "AGATHON" STEELS, the ingots are not only stored in the soaking pits, but are given a careful, scientific heat treatment that prepares and mellows the metal and brings out all the fine qualities of composition, before they are delivered to the rolls.

From the selection of raw materials to the last step in their manufacture, "AGATHON" STEELS are under the personal supervision of experienced men who know their business thoroughly.

Three railroads are at our service.

AGATHON STEELS

"AGATHON" Chrome Nickel	"AGATHON" Special Analyses
"AGATHON" Chrome Steel	"AGATHON" Vanadium
"AGATHON" Chrome Vanadium	"AGATHON" Silico-Manganese
"AGATHON" Nickel Steel	"AGATHON" High Carbon

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg. - The Hamill-Hickox Co., District Representative

The company has been buying a number of lathes and other machine shop equipment. The Westinghouse Electric & Mfg. Co., which is equipping a plant on Twenty-eighth street, Pittsburgh, for the finishing of 8-inch shells, has completed negotiations for approximately 200 lathes. The Driggs-Seabury Ordnance Corporation, Sharon, Pa., has bought 15 lathes and considerable other machine tool equipment. The Jones & Laughlin Steel Co. has purchased several lathes, milling machines and shapers for its new tube mill at Aliquippa, Pa. The Pittsburgh Valve Foundry & Construction Co. has bought several lathes and a 7-foot Cincinnati boring mill. The Crucible Steel Co. of America and the Jones & Laughlin Steel Co. are each increasing the capacities of their shafting departments.

Cleveland Market Brightens

Market conditions in Cleveland have improved during the past week. The slump of the previous week has disappeared and dealers are again endeavoring to meet the demand for second-hand as well as new tools. In some cases, contracts have not been closed owing to the temporary increase in price. While no orders of any particular magnitude have been entered, the scattered inquiries, coming largely from domestic sources, have been of fair volume. A number of companies not engaged in munition-making, recently have been putting out inquiries. Deliveries on certain types of machines has increased from last week's figure of 30 to 60 days to 60 to 90 days, and one dealer will not promise shipment in less than four months on some tools.

Cincinnati Strike Nearing End

The strike of union machinists in Cincinnati is losing ground daily. Of 2,400 men who were out on strike a month ago, almost 1,700 have returned to their respective shops and many are asking that they be given their old jobs. Machine shops are again running at full capacities, but are a little behind on deliveries. In Hamilton, O., machine tool shops are having much difficulty because of the refusal of striking machinists to accept the terms offered them, and very few plants are running at full capacity. In Dayton, Columbus and Springfield, efforts to call out machinists on strike have been unsuccessful and no trouble is reported by machine shop operators. Inquiries for all kinds of machine tools before local makers are heavier. The Russian government has been making large purchases recently of lathes, drills and portable bench grinders, and large eastern shops, such as the Bethlehem Steel Co., are asking for all grades of tools that can be delivered on short notice. Purchases by railroads continue to appear, but for the most part are light.

EASTERN STATES

BIDDEFORD, ME. — Work has been started on a 4-story, 40 x 60-foot addition to the Saco-Lowell machine shop plant, which will be used for setting-up purposes.

PORTLAND, ME.—The Electric Furnace Corporation has been incorporated; $1,000,000 capital stock; by Albert F. Jones, T. L. Croteau and A. B. Farnham.

BOSTON.—The Colonial Steel Co. is adding a brick warehouse to its plant at 57 Fargo street, South Boston.

BOSTON.—A 3-story blacksmith and machine shop of the Smith & Lovett Co., 125 Albany street, was damaged by fire.

BOSTON.—The Ajax Metal Hoop Corporation has been incorporated; $100,000 capital stock; by A. Melendez, president; Walter T. Belcher, Treasurer and I. S. Elliott.

BOSTON. — The Mechanical Development Co., has been incorporated; $50,000 capital stock; by H. W. Conant, president; Frederick C. Hersee, treasurer, and W. H. Forrest.

BOSTON.—Boston Steel & Mfg. Co., has been incorporated; $10,000 capital stock; by C. H. Hanson, president; C. Lowell Hanson, treasurer, and R. E. Hanson.

BOSTON.—The Bay State Pump Co., has been incorporated; $30,000 capital stock; by A. L. Nickerson, president; William W. Clarke, treasurer, and W. R. Dorr.

BOSTON. — Nelson Blower & Furnace Co., has been incorporated; $50,000 capital stock; by A. H. Nelson, president; William B. Marshall, treasurer, and F. Batchelder.

BOSTON.—Widger & Miller Co., has been incorporated to carry on the machinery business; $25,000 capital stock; by Irving E. Miller, Samuel S. Widger and Thurlow S. Widger.

LEICESTER, MASS.—A. Hankey & Co., Inc., have been incorporated as machinists, tool-makers, builders, etc.; $50,000 capital stock; by Albert A. Richards, Boston, president and treasurer; E. M. Churchill and N. J. MacGaffin.

LYNN, MASS.—The Davis Storage Lynn Battery Co., recently incorporated for the manufacture of electrical equipment, has leased a factory on Chestnut street, and plans to commence operations about Feb. 1.

PALMER, MASS.—The Wright Wire Co., Worcester, has awarded a contract for a 3-story brick, 50 x 100-foot addition to its plant, to be used as a rope department. All machinery will be motor driven.

PITTSFIELD, MASS. — The Standard Rotary Valve Co. has been incorporated; $30,000 capital stock; by Joseph H. Daniel Beaucage, Earl C. Jacobs and Stanley Smith.

READVILLE, MASS.—The Stafford Co. has let a contract for a foundry, 175 x 204 feet.

SOUTHBRIDGE, MASS.—John Bath & Co., Inc., Worcester, has purchased the E. L. Jay Machine Co. and will operate it as the Worcester Tool Room Equipment Co.

SPRINGFIELD, MASS.—The Clawfoot Co., has been incorporated to manufacture machinery; $50,000 capital stock; by M. S. Chapin, president; Causten Browne, Lowell, treasurer, and W. M. Wharfield.

WORCESTER, MASS.—The Wright Metal Action Co. has been incorporated to manufacture musical instruments; $500,000 capital stock; by Morris S. Wright, Josiah B. Millett, Boston, Hosea Mann and Charles T. Tatman. The company will take over a department of the M. S. Wright Co., and will secure a factory for manufacturing purposes.

BRANFORD, CT. — The Malleable Iron Fittings Co. has completed a machine building of brick, steel and concrete fireproof construction, four stories and basement, 68 x 165 feet, and will defer work on pattern shop until spring.

BRIDGEPORT, CT. — The Pequonnock Foundry Co. has started work on a 1-story, 48 x 75-foot foundry building.

HARTFORD, CT.—The Benson Mfg. Co. has been incorporated to make safety cranks for gasoline engines and other appliances; $50,000 capital stock; by Lawrence Benson, Lewis B. Holbrook and Charles R. Hale.

HARTFORD, CT. — The Whitlock Coil Pipe Co., has bought building No. 10, of the New Departure Mfg. Co., Bristol, in Elmwood, a 1-story, 132 x 260-foot structure, and will build an addition capable of housing the power plant necessary for manufacturing, as well as an office building.

NEW BRITAIN, CT. — Landers, Frary & Clark have awarded contract for 1-story, 43 x 104-foot brick, mill construction storage building.

NEW BRITAIN, CT.—The C. A. Danberg Co. is to be incorporated to carry on a brass foundry business, including the manufacture of brass and bronze castings. A building is now being erected. The incorporators will be Charles A. Danberg, Emil J. Danberg and Mrs. Anna Danberg.

NEW HAVEN, CT.—The Winchester Repeating Arms Co. is building a rolling mill to cost approximately $137,000. Westinghouse, Church, Kerr Co., 37 Wall street, has a contract.

NEW LONDON, CT.—Louis Schwartz, 8 Bank street, will erect a 1-story, 35 x 55-foot structure, to be used for light manufacturing.

NEW LONDON, CT.—The Shore Line Electric Co., Norwich, Ct., will build a 1-story, 45 x 71-foot power house at New London.

NORWICH, CT.—Work on the 2-story, 32 x 62-foot cement factory on Grove street for the Phoenix Fire Extinguisher Co. has been delayed pending adjustment.

PLANTSVILLE, CT.—Blakeslee Forging Co., which just has completed a large addition, has decided to erect another building.

STAMFORD, CT.—The Edgkene Co., has been incorporated to carry on a general manufacturing business in patented articles; $50,000 capital stock; by John B. Davidson, Floyd B. Bertram and Benjamin H. Mead, New Canaan.

BUFFALO.—The Buffalo General Electric Co., Electric building, has taken an option on a site on which it expects to erect an electric generating plant.

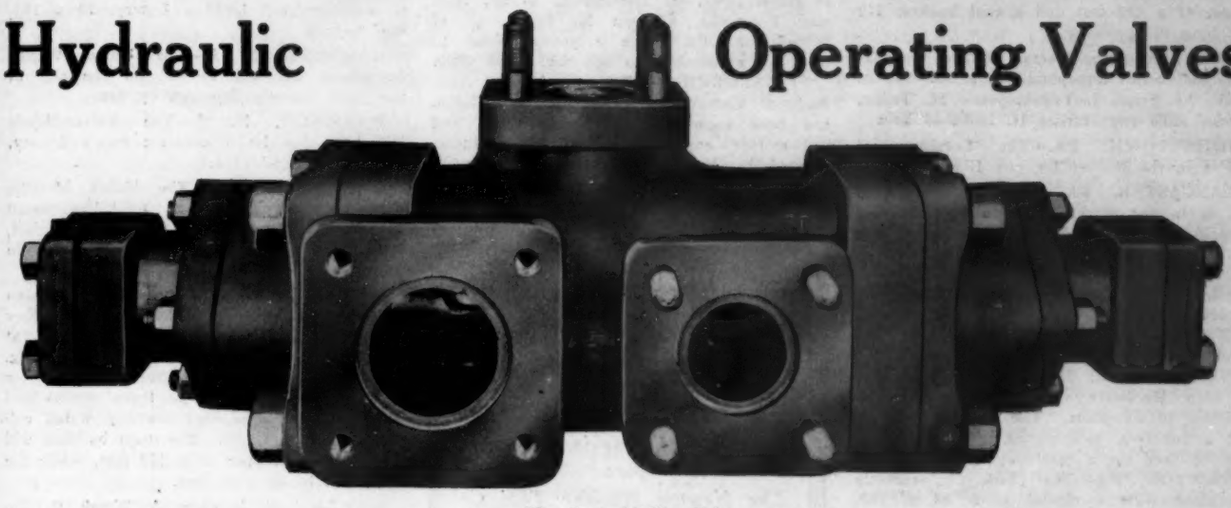
NEW YORK.—The Baltimore & Ohio railroad has put out a list involving 15 to 20 machine tools.

NEW YORK.—The Delaware & Hudson railroad put out a list of approximately 40 machine tools.

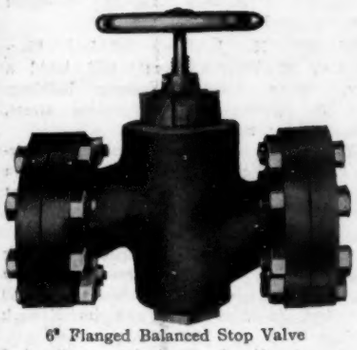
NEW YORK.—Robins Conveying Belt

SOUTHWARK

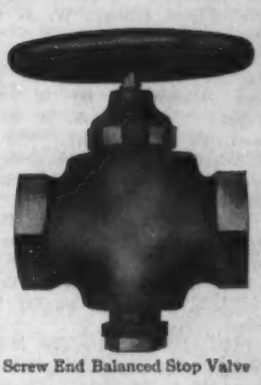
Hydraulic Operating Valves



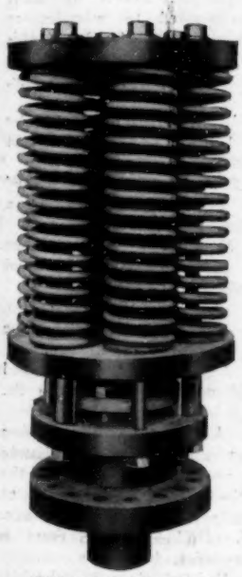
Pilot Control 3-Way Valve



6" Flanged Balanced Stop Valve



Screw End Balanced Stop Valve



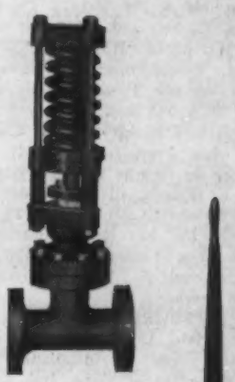
6" Hydraulic Seven Spring Shock Valve

Southwark Valves are made with the greatest care, of the best grade of materials, and under rigid inspection.

We are prepared to make special valves for any purpose or pressure.

Our pressure valves may be modified to meet any special requirements.

No matter what you require in hydraulic operating valves or hydraulic machinery for any purpose, let us figure with you.



Shock Valve

3-Way Operating Valve

Southwark Products

Presses, Riveters, Accumulators, Cranes, Hoists, Intensifiers, Jacks, Leather Packings, Pipe Fittings, Gauges, Valves, Turbo Generators for Direct and Alternating Current.

Turbo Blowers.

Surface and Jet Condensers with their Auxiliaries.

Southwark-Harris Valveless Oil Engine. For Marine and Stationary use—Built in sizes up to 1500 B. H. P.

Write for a copy of Bulletin 8 I. R.

Southwark Foundry & Machine Company, Philadelphia

Old Colony Building, Chicago Founded 1836 **Brown-Marx Building, Birmingham**

Say you saw it in THE IRON TRADE REVIEW

Co., 13 Park Row, is in the market for one 10-ton crane.

NEW YORK.—The Standard Shipbuilding Co., Wallace Downey, president, 8 Bridge street, has plans practically completed for a shipbuilding plant to be located at Shooters island.

COATESVILLE, PA.—The Worth Bros. Co. is receiving bids on a 1-story boiler house, 43 x 170 feet and a coal bunker, 112 feet long.

ERIE, PA.—The General Welding Supplies Co. has been incorporated; $5,000 capital stock; by Frank J. Tellon, Jessie M. Tellon, George Hills and Harriet H. Hills, of Erie.

JOHNSTOWN, PA.—The Lorain Steel Co. is in the market for one 10-ton crane.

LANCASTER, PA.—The Lancaster Iron Co. is in the market for one 10-ton crane.

MEADVILLE, PA.—The Simplex Mfg. Co., capital stock $10,000, incorporated by L. L. Lord, Otto Kohler, W. S. McGunnegel, P. W. Kaufman, John E. Reynolds, Meadville, and H. F. Giele, of Cleveland, to manufacture automobile supplies and vehicle parts.

NEW CASTLE, PA.—The American Car & Ship Hardware Co. plans to erect an addition to its plant. The addition will be 120 x 160 feet, two stories. The first floor will be used for a machine shop.

NEWTON, PA.—The Clark Co., recently organized with a capital stock of $25,000, has purchased equipment for the manufacture of pipe fittings; W. E. Clark is president.

OIL CITY, PA.—The National Pump & Machine Co., capital stock $2,545,000, has been incorporated by W. V. Miller, R. Huyck, C. H. Lay, S. R. Ball, F. S. Williams, all of Oil City. The company will manufacture pumps, engines, compressors, tools, fittings and machine supplies. C. H. Lay is treasurer.

PHILADELPHIA.—The Midvale Steel & Ordnance Co. is in the market for ten 5-ton cranes.

PHILADELPHIA.—The Newton Machine Tool Co. is in the market for one 10-ton crane.

PHILADELPHIA.—The Miller Lock Co., Frankfort, has prepared plans for a machine shop, 100 x 206 feet; a 2½-story warehouse, 75 x 250 feet and a 250-foot trestle.

PHILADELPHIA.—Disston & Sons, Tacony, manufacturers of saws, are receiving bids on two 1-story buildings, 50 x 61 feet and 50 x 367 feet.

PHILADELPHIA.—The Cann & Saul Steel Co. has been incorporated; $30,000 capital stock; by George E. Saul, David S. Cann and D. K. Billens, all of Philadelphia.

PHILADELPHIA. — The Pennsylvania Forge Co. has let a contract for the erection of a 1-story, 60 x 120-foot addition to be erected on Wakeling street and Frankford creek.

PITTSBURGH.—The American Sheet & Tin Plate Co. is in the market for one 10-ton crane for installation in the addition to the plant at Gary, Ind.

PITTSBURGH.—The Beaver Steel Co. has been incorporated; $5,000 capital stock; by Henry F. Gilg, Pittsburgh, Harry E. McWhinney and John W. Smart, Homestead, Pa.

PITTSBURGH.—The Jones & Laughlin Steel Co., building a tube mill at Aliquippa, Pa., is buying lathes, shapes and other repair shop equipment.

PITTSBURGH. — The Schmidt-McCormick Co. has been incorporated to engage in iron and steel construction; $5,000 capital stock; by R. T. McCormick, Irwin, Pa.; L. S. Schmidt and W. W. Johnson, Pittsburgh.

PITTSBURGH.—The American Car Wheel Co. plans to erect a foundry for the manufacture of double plate chilled iron car wheels. Charles D. Slocum is interested in the project.

PITTSBURGH.—The Westinghouse Electric & Mfg. Co., which is equipping a plant on Twenty-eighth street for the finishing of 8-inch shells, is buying lathes and other shell equipment.

PITTSBURGH.—The Motors Co., of Pittsburgh, capital stock, $500,000; incorporated at Dover, Del., by Herbert E. Latter, Norman P. Coffin, Clement M. Egner, all of Wilmington, Pa. The company plans to build an antomobile to sell for about $800.

PITTSBURGH. — The Pittsburgh Auto Radiator Corporation, capital stock $200,000, has been incorporated to manufacture and sell motors, engines and automobiles, incorporated by Herbert E. Latter, Norman P. Coffin, Selment M. Egner, all of Wilmington, Pa.

PITTSBURGH.—The Duquesne Light Co. has awarded a contract to the Westinghouse Electric & Mfg. Co. for two turbo-generators, having a total capacity of 75,000 horsepower, for installation in the Brunots island power station. Some auxiliary equipment will be purchased.

SCRANTON, PA.—The Keystone Munition Co., in which Chas. H. Singer, Clarks Summit, Pa., is interested, contemplates the erection of a plant at Scranton.

SHARON, PA.—The Driggs-Seabury Ordnance Corporation has been buying lathes and other tool room equipment.

SOUTH BETHLEHEM, PA.—The Bethlehem Steel Co. is in the market for a number of cranes, 25 tons or less in capacity.

TACONY, PA.—The Philadelphia Steel & Forge Co. is inquiring for one 25-ton crane.

ATLANTIC CITY, N. J.—The St. Charles Hotel Co. will erect a 12-story hotel on the beach front to cost $500,000.

DOVER, N. J.—Edwin H. Van Wyck, of Cranford, N. J., has purchased the plant of the Dover, Rockaway & Port Oram Gas Co.

ELIZABETH, N. J.—The Waclark Wire Co. has taken out a permit for the erection of a brass rolling mill to cost $30,000. This will adjoin the plant at Bayway, N. J.

GARWOOD, N. J. — The A. J. Beckley Perforating Co., of which T. R. Harvey is secretary, will build a 1-story, 50 x 180-foot factory.

HAMBURG, N. J.—The Union Waxed Parchment Co. will rebuild on the site of the plant recently damaged by fire.

HARRISON, N. J.—The Driver-Harris Wire Co. has let a contract for a 2-story, 45 x 150-foot addition.

HOBOKEN, N. J.—The Union Metallic Cartridge Co., Bridgeport, Ct., has leased the 12-story structure, 110 x 235 feet, located at Fifteenth and Hudson streets in Hoboken.

JERSEY CITY.—A contract has just been awarded to John W. Ferguson Co., New York, for a reinforced factory building at Baldwin avenue and High street, Jersey City, to be erected for the Durham-Duplex Razor Co. The building will be three stories and basement with reinforced concrete walls, columns, floors and roof. The main building will cover a ground area 40 x 179 feet, while the wing will be 40 x 80 feet.

NEWARK, N. J.—Edw. A. Wurth, 9 Clinton street, is building a 2-story, 26 x 100-foot machine shop and store to be leased to Umfried and Barkhorn.

NEWARK, N. J.—The Splitdorf Electrical Co., 98 Warren street, will build a 6-story, 60 x 300-foot factory building. Monks & Johnson, 78 Devonshire street, Boston, are the engineers.

NEWARK, N. J.—The International Aircraft Co., of New York, has submitted a proposition to the committee of 100 at Newark, offering to locate a plant for the manufacture of Zeppelin type airships.

NEWARK, N. J.—The Balbach Smelting & Refining Co. is about to erect a 1-story brick, steel and concrete machine shop, 60 x 125 feet, in connection with its Newark bay plant.

NEWARK, N. J.—The Secaw Chemical Co. has been incorporated to manufacture chemicals; $100,000 capital stock; by Archibald D. St. John, Newark; Walter Erlenkotter, Hoboken, and Edward W. Coffin, East Orange.

NEW BRUNSWICK, N. J.—The Howe Rubber Co. will build a factory to cost approximately $75,000.

PERTH AMBOY, N. J.—The United Lead Co. has let a contract for a 42 x 62-foot machine shop.

SAYREVILLE, N. J.—The Atlas Powder Co. has obtained options on 368 acres and will erect a new plant.

TRENTON, N. J.—The Fitzgibbon Co. will erect a plant 90 x 700 feet, along the Reading railroad.

TRENTON, N. J.—Bids will be received soon for the erection of an addition to St. Francis hospital.

TRENTON, N. J.—Appropriations having been sanctioned, state engineers immediately will resume work on the completion of the survey for the New Jersey ship canal to connect the Delaware river and Raritan bay.

WILMINGTON, DEL.—The Harlan & Hallingsworth Corporation has let a contract to the Fred A. Havens Co., Philadelphia, for a paint shop and other improvements including provisions for the installation of a 100-ton traveling crane.

SPARROWS POINT, MD.—The Maryland Steel Co. has let a contract for a 1-story, 75 x 625-foot foundry.

Why Crane Builders Are Busy

The Midvale Steel & Ordnance Co., Philadelphia, is in the market for ten 5-ton cranes.

The Newton Machine Tool Co., Philadelphia, is in the market for one 10-ton crane.

The Lorain Steel Co., Johnstown, Pa., is in the market for one 10-ton crane.

The Lancaster Iron Co., Lancaster, Pa., is in the market for one 10-ton crane.

The Robins Conveying Belt Co., 13 Park Row, New York City, is in the market for one 10-ton crane.

The Philadelphia Steel & Forge Co., Tacony, Pa., is inquiring for one 25-ton crane.

The Bethlehem Steel Co., South Bethlehem, Pa., is in the market for a number of cranes with 25 tons or less capacity.

The American Sheet & Tin Plate Co., Pittsburgh, is in the market for one 10-ton crane for installation in its addition at Gary, Ind.

CENTRAL STATES

CINCINNATI.—The Metal Stamping & Mfg. Co. has been incorporated; capital stock $10,000; by G. F. Dittman, E. A. Dittman and F. Morris.

CINCINNATI.—The Ault & Wiborg Co. will build a power plant 44 x 115 feet, for its dye works. Power plant and special dye making equipment will be needed.

CINCINNATI.—A concrete power building of ten stories will be erected at Broadway, New and North streets, to cost $300,000. John H. Boll, architect, is in charge of construction.

CINCINNATI. — Council has passed an ordinance allowing the Covington & Newport Street Railway Co. to extend the Cincinnati approach of the suspension bridge across the Ohio river, from Front street to Third street. The cost will be $1,500,000. A large amount of structural steel will be needed. Plans will be available shortly.

EAST LIVERPOOL, O.—The board of control has awarded a contract to the Pitt Construction Co., Pittsburgh, for the superstructures for a pumping station and a filter plant.

YOUNGSTOWN, O.—Harry W. Davis is obtaining options on land for a 13-mile extension to interurban lines extending from the Salt Springs road terminus to Warren, O.

YOUNGSTOWN, O.—The Mahoning & Shenango Railway & Light Co. has purchased properties of the Pennsylvania Power Co. and plans to make important improvements at the Ellwood City, Pa., plant.

CHARLESTOWN, W. VA.—The Oklahoma Smelter Co., Okla., capital stock $150,000, has been incorporated by G. E. Nicholson and Leigh Hunt, of Kansas City, Mo., Ralph Nicholas, of Dewar, Okla., and Houston G. Young, and V. H. Stuart, of Charlestown.

CHARLESTOWN, W. VA.—The Hartland Colliery Co. has been incorporated, capital stock $500,000, by John B. Hart, Edward Hart, W. S. Booth, of Clarksburg; Marcy McD. Price, of New York, and David Price, of Johnstown, Pa. The chief works will be in Henry and Pleasant districts of Clay county.

HUNTINGTON, W. VA.—The Rex Coal & Coke Co., capital stock $100,000, has been incorporated by George S. Wallace, L. R. Reese, J. W. Lawton and P. P. Gibson, of Huntington, and F. M. McClung, of Ashland, Ky.

WHEELING, W. VA.—The American Gas & Electric Co., which recently purchased a site of 600 acres south of Wellsburg on the Ohio river, will erect a power plant, estimated to cost $2,500,000, foundations for which have been laid by the Foundation Co., of New York.

HAZARD, KY.—A coal-mining plant will be installed by the Peerless Block Colliery Co., of which L. Wood Jones is president and Jarvis Collins general manager. The company has $100,000 capitalization.

HAZARD, KY.—The Kentucky River Power Co., which has begun the construction of a steam power plant at Glowmawr, near this point, for the purpose of furnishing electric current to coal mines in eastern Kentucky, has increased its capitalization from $150,000 to $200,000.

HELLIER, KY.—The Allegheny Coke Co. has plans to install additional coke ovens. It now operates 175 ovens.

KONA, KY.—The Elkhorn Coal Co. will double the capacity of its mining plant early in 1916. S. L. Bastin, Lexington, Ky., is manager of the concern.

SECO, KY. — Additional power and coal-mining machinery will be needed by the Southeast Coal Co., which has announced plans for opening another mine.

EVANSVILLE, IND.—Chamber of commerce has information as to a proposed bridge over the Ohio river six miles above Evansville to cost $500,000.

INDIANAPOLIS, IND. — The American Fan Co. has been incorporated to manufacture fans; $10,000 capital stock; by J. H. Everitt, T. S. Meaker and H. P. Euler.

INDIANAPOLIS.—The Elwood Foundry of Indianapolis has been incorporated with E. C. Scotten, B. H. Campbell and Lewis A. Coleman as directors. The company was capitalized for $10,000.

INDIANAPOLIS.—J. B. Coneys, superintendent of the Indianapolis division of the Pennsylvania Lines, last week announced that the company will begin the first of the year the construction of a new freight terminal to cost about $300,000. The building will be 70 x 800 feet.

CHICAGO.—The Chicago Nut Co., maker of brass nuts, will build a 2-story foundry costing $38,000 at 2513 West Twentieth street.

JOLIET, ILL.—The Bates Machine Co. is planning to spend $100,000 in extensions to increase its output of farm tractors.

DETROIT.—The Victor Screw Works, has been incorporated; $25,000 capital stock; by George J. Lieber, Edward J. Chapin and Victor M. Gunderson.

DETROIT.—The Detroit Pressed Steel Co., maker of steel stamping and automobile parts, has increased its capital stock from $250,000 to $650,000, following an increase of its plant.

LANSING, MICH.—The Auto Wheel Co. is about to construct a third addition to its plant at a cost of $75,000.

MUSKEGON, MICH. — The Lindermann Machine Co. is erecting an addition, 31 x 153 feet, and will increase its power plant. Metal working machinery is built.

POPLAR BLUFF, MO.—Water tube boilers, feed pumps, electric generators, heat condensers and two 300-horsepower uniflow engines are to be installed in the electric light plant at a cost of about $50,000. Fuller-Coult Engineering Co., St. Louis, is the engineer.

ST. LOUIS.—The Heyward Wrench Co. has been incorporated to manufacture combination wrenches; $100,000 capital stock; by Hubert H. Heyward, Springfield, Mo., Homer Heyward and Lewis T. Dunaway.

TRENTON, MO.—The Trenton Gas & Electric Co. will build an electric light plant and install a generator and fuel oil engine at a cost of $25,000. An ice plant costing $36,000 is also planned.

SOUTHERN STATES

QUANAH, TEX.—The city of Quanah will install a diesel engine in the electric power house.

BRISTOL, TENN.—G. L. Aronhime, is purchasing refrigerating equipment for an abbatoir and packing plant.

BRISTOL, TENN.—The Carolina, Greenville, & Northern Railway plans to build an electric line from Bristol to Knoxville, Tenn., and has announced that contracts for the first section will be let at once.

CHATTANOOGA, TENN. — The Lookout Paint Mfg. Co. is purchasing some additional special machinery, including a crusher. C. B. Samuel is buyer.

CHATTANOOGA, TENN.—The Hamilton Motor Car Co. will build a garage at a cost of $20,000, and will add considerable equipment to its repair department.

CHATTANOOGA, TENN.—The Walsh & Weidner Boiler Co., which has been making boilers and tank work exclusively, has added the manufacture of structural material to its line.

FAYETTEVILLE, TENN.—W. C. and J. Moore are erecting a building which will be equipped for the manufacture of vehicles.

KNOXVILLE, TENN.—Electric power will be used in the operation of the planing-mill of the Witt Lumber Co., which is now being equipped. The concern has $15,000 capitalization.

OLLTEWAH, TENN.—The Vest Excelsior Co. is in the market for power and special equipment for the manufacture of excelsior. J. C. Vest is general manager.

SHELBYVILLE, TENN. — The Robinson-McGill Mfg. Co. is buying machinery for the manufacture of underwear. Equipment to provide a capacity of 100 dozen suits a day is to be installed.

WESTERN STATES

HELENA, MONT.—The Catron Coke & Coal Co. is making arrangements to mine its properties. This company proposes to build a railroad 40 miles south from Ulm to its property.

CALDWELL, IDA. — Missouri Valley Bridge & Iron Co. has been awarded a contract for construction of bridge at Parma.

LEWISTON, IDA.—The city council has adopted an ordinance granting a 99-year lease to Nez Perce & Eastern Railway on a site for terminals.

McCAMMON, IDA.—Date of election to vote on bonds for construction of a water works system has been changed from Dec. 14 to Dec. 21. The amount is $20,000.

ABERDEEN, WASH.—Geo. H. Tilden, of Seattle, has asked for an electric lighting and heating franchise in Aberdeen.

PASCO, WASH.—The county commissioners of Franklin and Walla Walla counties consider the construction of a bridge oven Snake river. C. E. Fowler, consulting engineer, Central building, Seattle, estimates the cost at $50,000.

SEATTLE, WASH.—Consideration is being given to the proposition of the purchase by the city of Seattle of the Elwha power project, owned by the Olympic Power Co. The property will be developed by the city, if purchased.

ALBANY, ORE.—L. M. Curl, mayor, is head of a committee to secure erection of a plant of the Thomas Pulp & Paper Co. in the city of Albany at a cost of $150,000.

ENTERPRISE, ORE.—Thomas Denny will build and equip a machine shop at Enterprise.

GRANTS PASS, ORE.—The council is considering the question of an $80,000 bond issue for water works.

PORTLAND, ORE.—It is reported that the Union Pacific will construct the incompleted extension from North Yakima to Tacoma.

SALEM, ORE.—The county courts of Marion and Polk counties have decided to build a bridge across the Willamette river at Salem, the two counties to bear the expense of construction which will be approximately $233,000.

CANADA

MONTREAL, QUE.—The Governor Fastener Co., Ltd., has been incorporated to manufacture metal devices; $50,000 capital stock; by Samuel W. Jacobs, Alex R. Hall and Harvey Gough, of Montreal.

MONTREAL, QUE.—The Canadian Brass Bedsteads Co., Ltd., has been incorporated to manufacture bedsteads and metal household furniture; $45,000 capital stock; by Eugene H. Godin, Joseph E. Morier and Ernest Charette, Montreal.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery April 1.)

Bessemer, valley	$18.50 to 19.00
Bessemer, Pittsburgh	19.45 to 19.95
Basic, Pittsburgh	18.45 to 18.95
Basic, eastern Pa.	17.75 to 18.00
Malleable, Pittsburgh	18.45 to 18.95
Malleable foundry, Chicago	18.00
Malleable foundry, Philadelphia	20.00 to 20.50
Malleable foundry, Buffalo	18.00 to 19.00
No. 1X foundry, Philadelphia	19.00 to 19.50
No. 2 foundry, Pittsburgh	18.45 to 18.95
No. 2 fdy., first half, Pbgh.	15.95 to 16.45
No. 2 foundry, first half, valley	15.00 to 15.50
No. 2 foundry, Cleveland	18.30
No. 2 foundry, Ironton	17.00 to 17.50
No. 2 foundry, Chicago	18.00
No. 2X foundry, Philadelphia	18.50 to 19.00
No. 2X fdy., N. J. tidewater	18.50 to 19.00
No. 2X foundry, Buffalo	17.50 to 18.50
No. 2 plain, Philadelphia	17.75 to 18.25
No. 2 plain, N. J. tidewater	17.75 to 18.25
No. 2 plain, Buffalo	17.00
No. 2 southern, Birmingham	14.00 to 14.50
No. 2 southern, Cincinnati	16.90 to 17.40
No. 2 southern, Chicago	17.50 to 18.00
No. 2 southern, Phila. delivery	17.50 to 18.00
No. 2 southern, Cleveland	18.00 to 18.50
No. 2 south'n, New York docks	17.50 to 18.00
No. 2 southern Boston, docks	16.75 to 17.25
No. 2 south. interior, New Eng.	18.00 to 19.00
No. 2 southern, St. Louis	17.90
Virginia No. 2X furnace	16.50
Virginia 2X, Philadelphia	19.25
Virginia 2X, Jersey City	19.50
Virginia 2X, Boston points	19.75
Gray forge, eastern Pa.	17.50 to 17.75
Gray forge, Pittsburgh	17.95
Gray forge, Birmingham	10.50
Silveries, 8 per cent, Jackson, O.	24.00
Silveries, 8 per cent, Chicago	25.50 to 26.50
Standard low phos., Phila.	30.00 to 31.00
Lebanon low phos., furnace	30.00 to 32.00
Low phos., Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.25 to 22.25
Charcoal, Buffalo	19.00 to 20.00
Charcoal, Birmingham	21.50

IRON ORE

Lake Superior Ores.
(Lower Coke Reports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.45
Old range, non-Bess., 51½ per cent	3.00
Mesabi non-Bessemer, 51½ per cent	2.80

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

*Foreign Bess., 50 to 65 per cent	8 to 8½
For'n non-Bess., 50 to 65 per cent	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$2.25
Connellsville fur., first half	2.35 to 2.50
Connellsville foundry	3.00 to 3.25
Connellsville fdy. contr.	3.00 to 3.25
Wise county furnace	2.75 to 3.00
Wise county foundry	3.00 to 3.25
Pocahontas furnace	2.75 to 3.00
Pocahontas foundry	3.00 to 3.25
New River, foundry	3.25 to 3.75
New River, furnace	3.00 to 3.25

FERRO ALLOYS AND STEEL MAKING METALS

Ferro mang., delivered (prompt)	100
Ferro mang., Balti., (future)	100.00
Spiegeleisen 20 per cent, furnace	28.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00
Ferro-silicon, 50 per cent, Phila.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $27.00; 10 ot 11 per cent, $28.00; 11 to 12 per cent, $29.00; 12 to 13 per cent, $30.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-chrome, 4 to 6 per cent carbon, 25 cents per pound; 2 per cent carbon, 45 cents per pound, delivered.

Ferro-vanadium, $3.15 per pound of contained alloy, Pittsburgh.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

Nickel, 50 to 55 cents per pound.

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.40
From Pittsburgh	.619
From Youngstown	.619
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Ferro-tungsten, nominal.
Cobalt metal, nominal, Pittsburgh.
Aluminum, 59 to 60 cents per pound, New York.
Ferro-molybdenum, Pittsburgh, nominal.

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$34.00 to 36.00
Bessemer billets, Phila.	28.00
Forging billets, Phila.	45.00 to 50.00
Forging billets, Pbgh. (nominal)	55.00
Forging billets, Chgo.	36.00 to 40.00
Wire rods, Pittsburgh (nom.)	39.00 to 40.00
Bess. bill., Youngstown	29.00 to 30.00
Open hearth billets, Youngstown	30.00
Bessemer billets, Pittsburgh	29.00 to 30.00
Open hearth billets, Pittsburgh	30.00
Bess. sheet bars, Youngstown	30.00
Op. h'th sheet bars, Youngstown	30.00
Bess. sheet bars, Pittsburgh	30.00
Op. h'th sh. bars, Pbgh.	30.00
Muck bar, Pittsburgh (nominal)	34.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh. & Chg.	1.25c
Stand. op-h'th rails, Pbg. & Chg.	1.34c
Light rails, 8 to 10 lbs., Pbgh.	1.70c
Light rails, 8 lb. Chgo.	1.49c
Light rails, 12 to 14 lbs., Pbgh.	1.65c
Light rails, 12 lbs. Chgo.	1.44c
Light rails 16 to 20 lbs., Pbgh.	1.60c
Light rails 16 to 20 lbs., Chgo.	1.39c
Light rails 25 to 45 lbs., Pbgh.	1.55c
Light rails 25 to 45 lbs., Chgo.	1.34c
Relaying rails, standard, Pbgh. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chgo.	21.50 to 22.50
Angle bars, st. sect., Pbgh. base	1.50c to 1.75c
Angle bars, st. sections, Chicago	1.50c to 1.75c
Spikes, railroad, Pbgh.	2.00c
Spikes, railroad, Chgo.	2.10c
Track bolts, Pbgh.	2.50c
Track bolts, Chgo.	2.50c to 2.60c
Tie plates, Chgo.	36.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18

Buffalo to:—

Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brookyln (by canal)	1.25 to 1.60

Virginia furnaces to:—

Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88

Birmingham, Ala., to:—

Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75

Chicago to:—

Des Moines	$2.80
Milwaukee	.50
Moline, Ill	1.40
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:—

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	1.70c to 2.00c
Structural shapes, Chgo.	1.99c to 2.19c
Structural shapes, Philadelphia	1.859c to 2.159c
Structural shapes, New York	1.869c to 2.169c
Struc. shapes, San Francisco	2.00c to 2.05c
Tank plates, Chgo.	1.99c to 2.19c
Tank plates, Pittsburgh	1.70c to 2.00c
Tank plates, Philadelphia	1.959c to 2.159c
Tank plates, New York	1.969c to 2.169c
Bars, soft steel, Pittsburgh	1.70c to 2.00c
Bars, soft steel, Chgo.	1.99c to 2.19c
Bars, soft steel, Philadelphia	1.859c
Bars, soft steel, New York	1.869c
Hoops, carloads, Pittsburgh	1.90c
Bands, Pittsburgh	1.70c
Shafting, Pbgh., contr. carloads	50 to 52 off
Bar iron, Chgo.	1.65c to 1.70c
Bar iron, Philadelphia	1.959c
Bar iron, New York	1.969c
Bar iron, Cleveland	1.75c to 1.80c
Bar iron, Pittsburgh	1.80c
Hard steel bars, Chicago	1.80c
Smooth fin., mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	2.50c to 2.75c
No. 28, black, Chgo.	2.69c to 2.94c
No. 28, tin mill, black, Pbgh.	2.45c
No. 28, galvanized, Pbgh.	4.75c to 5.25c
No. 28, galvanized, Chgo.	5.19c
No. 10, blue anl., Pbgh.	2.25c
No. 10, blue annealed, Phila.	2.359c
Tin plate, 100 lb., coke base	$3.60

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll. and re-anl.	30 cents
Hot roll'd pick'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller leveling	10 cents
Patent leveling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxiding	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free fr. mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock.	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ⅜ to 3 inches	78	63½
Iron, ⅜ to 2½ inches	70	52
	Lap-weld.	
Steel, 2½ to 6 inches	77	62½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	68
Iron, 3½ to 4½ inches l. c. l.	56

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nail jobbers, Pittsburgh	$2.00
Plain wire, jobbers, Pittsburgh	1.85
Galvanized wire, jobbers, Pbgh.	2.55
Polished staples, Pbgh.	2.15
Galvanized staples, Pbgh.	2.85
Barb wire, painted, jobbers, Pbgh.	2.15
Barb wire, galv., jobbers, Pbgh.	2.85